

# Quality Risk Management (QRM) in Pharmaceutical Industry: Tools and Methodology

Shweta Santosh Shelar

*Oriental College of Pharmacy, Sanpada, Navi Mumbai*

**Abstract-** The aim of article is to provide quality risk management process and there remedial action which is appropriate to the hazard. In that process or material is passes through different process that is manufacturing, processing, distribution in these process various procedure which may an hazard issue come across different process which is risk related and therefore risk management by using different steps involved that is are identification, analysis, control measures, communication and review of risks which prevent, product or process to cause any hazard. By using competent technical staff and proper training of current knowledge assessing about probability, severity and sometimes detectability of risk. The assessment of QRM very important for proper documentation and implementation of new products or processes.

**Index terms-** Risk , risk management, hazard, quality risk management

## INTRODUCTION

- Quality risk management:- It is defined as management strategy which maintain the quality of product by ensuring the product safety and efficacy of product by measuring out there probable causes and there consequences.
- Risk management is very important and essential part to be utilise which includes all the business, finance, various pharmaceutical industry etc.
- By the risk management we can easily asses the probability of occurrences and there probable consequences.
- For any product maintenance of quality thought it's shelf life is very important and therefore t maintain the quality of products the quality risk management it plays an important role.
- If risk management in facility is proper maintained so, that leads to a good quality of products.
- Risk management is also cost effective parameters that leads to decrease the cost of

process by determine the process and steps involve in it. if any step which not affect any quality parameter of product so, that step can be eliminated which can be cost effective

- Effective quality risk management can facilitate better and more informed decisions, can provide regulators with greater assurance of a company's ability to deal with potential risks and can beneficially affect the extent and level of direct regulatory oversight.
- In that existing quality practices , regulatory guidelines, industrial guidelines that makes the good quality management practices.
- It specifically provides guidance on the principles and some of the tools of quality risk management that can enable more effective and consistent risk based decisions, both by regulators and industry.1

## OBJECTIVES OF QUALITY RISK MANAGEMENT

- 1 The evaluation of the risk to quality should be based on scientific knowledge and ultimately link to the protection of the patient.
- 2 The level of effort, attention and documentation of the quality risk management process should be commence with the associated level of risk.
- 3 QRM should be strong and consistent and responsive to change.
- 4 The ability of continuous development and improvements should be fix in the Quality Risk Management (QRM) process. 2)

### Scope

- 1 QRM applies to all the GMP operation and processing and manufacturing areas with new and existing process method, utilities, equipment and process.

- 2 cGMP is very important and informative tools for understanding quality risk management that can helps for pharmaceutical quality system.
- 3 QRM also helps in different Manufacturing process, layout, systems, distribution and other integral parts in facility. QRM should be an integral element of the pharmaceutical quality system (QS).
- 4 Science-based regarding quality decisions and filing commitments can be based on process and QRM Its effective implementation.
- 5 QRM also manages strategy that mainly focuses on critical quality attributes and critical process parameters. 1)

the drug product throughout their product lifecycle. 5,6)



### Responsibilities

Quality risk management activities are done in a team which is highly competent and experienced person that QRM activities conducted in interdisciplinary members team which is specialised in various departments.3)

- 1 take responsibility for coordinating quality risk management across various functions and departments of their organization
- 2 assure that a quality risk management process is defined, deployed and reviewed and that adequate resources are available.4)
- 3 External consultants to participate in the QRM matrix team where they can provide specific expertise or knowledge. Their role should be justifiable and clearly defined and the resultant accountability must be understood.
- 4 A technical agreement or other equivalent document with the consultant may be appropriate where a GMP responsibility is assumed.

- Quality risk management process can be outlined in the form of diagram. Other methodologies can also be used. The mainly importance on each part of the framework which may be differ from case to case but a robust process will incorporate to determine the extent of test to be carry out.
- These decisions that take which based on previous data and information which useful to eliminate risk by risk management process. 7)

Steps involve in quality risk management:

- 1 Initiating a QRM process
- 2 Personnel involve in QRM
- 3 Risk assessment
  - a. Risk identification
  - b. Risk analysis
  - c. Risk evaluation
- 4 Risk control
  - a. Risk acceptance
  - b. Risk reduction/ elimination
- 5 Risk review
- 6 Risk review

### Process of quality risk management

- The purpose of the QRM is to get desired quality of finished pharmaceutical product (FPP) according to the quality target product profile (QTPP) and achieving knowledge and risk associated with it. In that identify the risks in future and knowledge gaps.
- The QRM process plays a important role actively in prioritization and minimization of risks.
- -Quality Risk Management (QRM) is process for identification, control measures, discussing the parameters and review on risks to the quality of

### 1. Initiating a QRM process:-

- QRM activities should be described and design using systematic processes which coordinate, improvised science-based decision-making which associated with risk.
- In that data and information collected which previously cause harm or injury and also remedial and corrective action associated with it.

Identify:-In that identification of leader and resources which is necessary

Specify - It is a deadline to finish with work of decision making for risk management process.

Specifying areas where persons identified the critical steps involved in drug manufacturing, equipment risk associated with it and give responsibility to individual for managing risk. Risk management will be initiated

This initiation of process implemented to certain parameters which is as follows:

- Product complaints and product recalls
- Failure in external and internal audit
- Finding root cause analysis by risk control tools
- Product quality reviews
- Failure in stability results of products at mid or final product
- Numbering and significance of quality defect(e.g: Recall etc) 8,9)

2. Personnel involve in quality risk management:-

-The implementing process in pharmaceutical manufacturer or regulatory bodies should ensure that personnel with appropriate product-- Personnel should be very competent that applies there knowledge or skills and made the impactful plan and eliminate or reduce the risk with cost effective management.

The personnel appointed should be able to:

- carry out a risk review, identification and evaluation
- identify and analyse risk associated with any product , process, material
- evaluate the risks and identify which risk should be reduced and which risk can be accepted;
- Suggest and execute adequate risk for control measures.
- Consider the impact or consequences of risk findings and implementation of new process which directly affect quality of products.

3. Risk assessment:-

Definition:- consists of the identification of hazards and the analysis and evaluation of risks associated with exposure to those hazards.

Risk assessment consists of the identification of hazards and the analysis and evaluation of risks associated with exposure to those hazards. It includes risk identification, risk analysis and risk evaluation.

Three fundamental questions are often helpful.

1. What might go wrong?
2. What is the possibility that it will go wrong?
3. What are the consequences? 8)

- Risk assessment is required to control the impactful risk control of hazardous process. Risk assessment look after the materials, process, equipment, finished product and in process product storage, distribution. Mainly the risk associated with product are related to biological, chemical and physical and assessment of risk helps to identify that accept the risk or reduce the risk.
- The results of a risk assessment can be numeric i.e. quantitative or it is in the form of range ( high / low / medium) depend upon risk to get evaluated , During or after score or points given which is to be evaluated to minimise and understand risk associated.
- In quantitative risk assessments, it is mostly related and focuses on to specific type of risk and there specific and mostly occurred consequences. thus, quantitative risk estimation is useful for one particular consequence at a time.
- Risk management tools use to measure risk that related to severity and there frequency in overall risk analysis and also helps to measure combination of risk associated with same process. The intermediate steps within a scoring process can sometimes employ quantitative risk estimation. 4)

Risk identification

Definition: - In that determination of hazard by previous records and documents.

- Risk identification addresses the “What might go wrong?” question, including identifying the possible consequences. This provides the basis for further steps in the quality risk management process.
- Risk identification is a systematic use of information to identify hazards referring to the risk question or problem description. Information

can include historical data, theoretical analysis, informed opinions, and the concerns of stakeholders. Risk identification addresses the “What might go wrong?” question, including identifying the possible consequences. This provides the basis for further steps in the quality risk management process. 4)

#### Risk analysis

Definition:- In that determination of causes and there probability of failure . In that risk level which shows that how severe the hazard can be.

Risk analysis is the estimation of the risk associated with the identified hazards. It is the qualitative or quantitative process of linking the likelihood of occurrence and severity of harms. In some risk management tools, the ability to detect the harm (detectability) also factors in the estimation of risk. 9)

#### Risk evaluation

Definition: - In that based on documented evidence and analysis determine the risk criteria.

- Risk evaluation uses after identification and analysis of particular risk or hazard and then analyse that it is within acceptable criteria or not. Risk evaluations should consider the all three questions which given above. 10)
- By determining the related assumptions and there sources can gives the idea of output that determines the set limitations. In that failure chances can be gaps in knowledge or unexpected/ sudden changes associated with product which happens during process.
- Different Steps Involved In the Risk Assessment Are 5,6)

#### 1. Collect and organise information

- -Gathering related information, reviewing appropriate references & identifying consequences.
- Tools can be used to categorised depend upon their information giving capacity.

#### 2. Risk questionnaire

It is the starting point of the QRM in which questions releted with risk associated problems given to various departments and by that way outlining the most frequent problems and risk factors associated with

it.by that questionnaire period scope and objectives of conducting audit can be determined.

#### 3. Identify tools required and different tools include

- 1 Failure Mode Effects Analysis and Failure Mode Effects and Criticality Analysis.
- 2 Fault Tree Analysis.
- 3 Hazard Analysis and Critical Control Points.
- 4 Hazard & Operability Analysis.
- 5 Preliminary Hazard Analysis.
- 6 Statistical tools 5,6)

#### 4. Risk control:-

Definition: - It is a process in which implement the parameters by reducing the risk or stabilise that parameters by accepting risk to the specified level.

- The process through which decisions are made related to implement new process or maintain that same process and keep it in set level or ranges.
- Decision taking higher authority should analyse process which includes cost effective analysis and management and understanding the specified level of risk control.11)

Risk control might focus on the following questions:

- Whether the risk is within acceptable level?
- What desicision take to reduce or eliminate risks?
- What are the benefits, risks and resources associated with new process implemented.
- Are new risks implemented it can be controlled or not. 12,13)
- Specific corrective actions should be taken advance to identified risk, including the correct implementation or corrective action to the risk which is analyse. In that record should kept with corrective actions. 14)
- In that risk control 2 type involve
  - 1 Risk acceptance
  - 2 Risk reduction

#### Risk acceptance:-

Definition:-. Undertaking the risk by maintaining the critical process parameters and critical quality attributes.

- Risk management team will prepare the meeting which related with plan of minimizatiin of risk

and assure the safety from hazard. The mitigation plan will cover all the activities of risk according to their priority level. Risk will be analyzed and the mostly occurred root causes of problems determine with corrective action in future.

- Risk acceptance can be a formal decision to accept the residual risk or it can be a passive decision in which residual risks are not specified 13)

Risk reduction:-

Definition: - by applying the remedial action or corrective action reduce the risk or control on risk severity.

Risk reduction includes actions taken to reduce the impact and frequency of harm. the implementation of risk reduction control measures can includes new risks into the process/ system or increase the importance various existing risks hence, it is very important to again check the risk which previously occurred and identify and evaluate possible changes can be done for risk reduction.

Consider measures/actions that could:

- 1 Reduce the impactful occurrences of severity of risk and stop failure so before that check whether any changes can make product better or reject the batch or product recalls.
- 2 Reduce the frequency of Inspect defect out of batch
- 3 Increase the frequency of validation or qualification of machine or equipment.
- 4 Application of various tools and methodologies associated with it and there consideration.
- 5 Identify the minimization/actions have introduced new risks. 15)

#### 5. Risk review

Definition: - the inspection of risk management which shows the issues during ongoing process monitoring and final product quality.

- QA and management reviewed the progress of ongoing risk management process by applying new knowledge and experience and check the improvement in quality management process. Review of quality management process can look out the various issues regarding product quality, safety there efficacy during or after product

manufacturing. Therefore various audit, inspection is required to make sure that the process is under control. The risk review team will review quarterly or as required the status of all risk mitigation plans depending upon the level of risk.

- The result of the risk review will be reported and documented and that risk register and timely updated to check the actions and decisions taken. Risk management is a part of Quality Management System that includes reporting and documentation. 16,17)

#### 6. Risk communication:-

- It is the distribution of information about risk review and risk management of decision makers management team and that risk plan should be appropriately documented and communicated for more resolution of problems.
- Communications may include between those persons which related to the regulatory personnel or industrial i.e. management personnel or various authority. Communication is very important to facilitate and improve the resolution of risk and there methods of resolution of risk. 2, 1 8,)

#### CONCLUSION

The principle goal of risk management at the highest organizational levels is to use risk management to bring formality to risk-informed decision making which was easily associated with resource allocation and ensuring patient safety. Ultimately, applying risk management to pharmaceutical industry should reduce the number of threats or minimize their impact through the consistent use of the tools/methods and periodic review. The output of the risk management supports to the organization to meets the defined goals towards protection of public health. Effective Quality Risk Management can facilitate better and more informed decisions, can provide regulators with greater assurance of a company's ability to deal with potential risks, and might affect the extent and level of direct regulatory oversight.

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**AUTHOR DETAIL:**



Santosh Shelar  
Oriental college of pharmacy, Sanpada,  
Navi Mumbai