Rx Risk-Management

MAKING THE CASE FOR FMEA

THE CHALLENGE

Current state of Rx Risk-Management

Most risk-intensive industries have advanced risk-management methods to evaluate, anticipate and prevent life-threatening mistakes. In the aviation industry, planes have redundant back-up systems, pilots are trained and certified, flight simulators are used to allow pilots to experience "crashes" without injury, pre-flight checklists are a must and passengers are always instructed in how to handle an emergency. Sophisticated risk-management systems also exist for the biopharmaceutical industry…until a drug is actually launched.

It is rather paradoxical – and frankly unnerving – that our most systematic and rigorous processes to protect data integrity and human safety are used during the clinical trial phases of a new compound. Once it comes to managing the risks of a medication that is about to be commercialized or already in use, we default to an ad hoc approach. With human lives at stake, it is time to adopt a standardized method for managing drug-safety risks – both before and after regulatory approval.

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THE SOLUTION

What is FMEA?

FMEA, or Failure Mode and Effects Analysis, is the standardized risk-evaluation method most widely used across risk-intensive industries. The key attributes of FMEA are that it is:

- Pre-emptive
- Systematic to ensure comprehensive analysis
- Able to prioritize risks by degree of hazard
- Flexible, enabling various industries to adapt it to their needs

Where is FMEA used?

The attributes that make FMEA ideal for proactively analyzing and improving a product or process for the pharmaceutical industry are the same attributes that have rendered it useful for NASA, the military and the Nuclear Regulatory Commission.

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INTO COMMERCIAL REALITY

Within the healthcare sector, FMEA has found broad acceptance. The Food and Drug Administration (FDA) has been using FMEA, citing it as a recommended risk-evaluation method in the 2005 RiskMAP guidance, and as one of several methods of improving food and drug quality in the 2006 Quality Risk-Management Guidance. In 2010, the Center for Devices and Radiological Health division of the FDA included FMEA in its guidance for percutaneous transluminal coronary angioplasty catheter manufacturers.

In its approach to adapting FMEA, the Department of Veterans Affairs' National Center for Patient Safety (NCPS) reinforced the flexibility of this risk-evaluation method. The Health Failure Mode and Effects Analysis (HFMEA) was developed by NCPS after it evaluated the utility of various risk methodologies for healthcare. As a result of the analysis, HFMEA retains the FMEA principles while integrating the strengths of other methodologies. NCPS published a tutorial about HFMEA in the 2002 Joint Commission Journal on Quality Improvement.

FMEA has had advocates in the healthcare sector as far back as 1994, when the Institute for Safe Medication Practices (ISMP) applied the methodology to analyze the intravenous patient-controlled analgesia process. ISMP used FMEA to stage the care process, identify how steps may go wrong and determine the reasons or causes for potential failures. They then scored the degree of hazard for each failure, and defined the actions and tools needed to fix them.

How FMEA can be applied in the pharmaceutical industry

The detailed process analysis used by ISMP should be adopted as a new standard methodology in pharmaceutical risk-management, albeit with some modest but important modifications. A few of these modifications are outlined below:

- **Human factor failures** – we need to be realistic in our expectations and understand that failures cannot be eliminated in a human-based system, such as the prescription of medication, its delivery, administration and management. Human failures can only be mitigated via redundancy. More than one stakeholder should always have a role in mitigating each point of potential failure.
- **Adult learning principles** – the communications about the safe use of medications should deliver educational content and also enable the learner to apply the knowledge in their daily activities. Adults tend to forget the majority of what they read passively. Augmenting educational content with "enabling tools," such as checklists, can help the learner better retain and use the new insights.
- **Targeting** – each tool should be targeted to a specific audience and timed to a specific point of care to encourage implementation and avoid handoffs that can create gaps in the process.

With these modifications, FMEA can be used successfully in the pharmaceutical industry. The methodology breaks down medication use into process and sub-process steps, and then identifies the failure modes, causes and tools needed at each step to address:

- What could go wrong
- Why the failure occurs
- How the failure needs to be fixed

Checklists – valuable tools for addressing points of failure

Because FMEA defines very specific process failures and the reasons they occur, checklists are the natural byproduct of the methodology. Checklists are effective adult education tools because they:

- Deliver key educational content, enabling end users to immediately put the information into action
- Remind end users repeatedly of actions that need to be taken, building habits
- Offer a familiar and easy-to-use design

Checklists are also easy to deliver at the point of care through electronic medical records, pharmacy systems and other patient-support resources. Dr. Peter Pronovost and Dr. Atul Gwande have both published on the utility of checklists in hospital settings. Some of the attributes of an effective checklist are:

- Short length (fits on one page)
- Content focused on high-risk items (FMEA helps to prioritize these)
- Simple and exact (FMEA targets effectively)
- Language familiar to the end user

FMEA in REMS design

Perhaps the most common application of FMEA in the medication-use process has been in the design of a Risk-evaluation and Mitigation Strategy (REMS) from scratch. Here is the typical approach:

1. Define the risk based on the potential adverse effects, the degree of hazard and the extent of scientific evidence (known, potential, unknown).

2. Form a multidisciplinary team that represents a broad range of data and stakeholder perspectives in the analytical process.

3. Graph the process of prescribing, dispensing, administering and managing the medication.

4. Conduct analysis by determining WHICH process/sub-process steps could fail and WHY.

5. Define tools that support all relevant stakeholders and that put the content about safe use into action.

6. Implement program and measure results for continuous improvement.

It should be noted that the graphic process described in step 3 can be augmented by conducting custom ethnographic research of the practices of target stakeholders in the care process. Ethnography is a research methodology that observes the practices and behaviors of individuals in their natural environments. Qualitative in its approach, it is able to provide deep insights into a real world setting by observing what "people do" versus what they may "say they do" as captured in surveys or interviews. Ethnography is a valuable tool that allows for the identification of opportunities beyond that of market research, to help provide a roadmap for process improvements when used appropriately. [Hollot and Bullano, *Radiology Management*, July 2010]

Here's a simple example that demonstrates the value of FMEA in REMS design. One specific step in the process of medication use is when a healthcare provider prescribes a medication. One sub-process in this step is that the provider should be counseling the patient on the medication being prescribed. The FMEA method identified a possible point of failure within this sub-process step with the healthcare provider forgetting to counsel the patient on the prescribed medication. The tools to fix such a possible failure included:

- Reminder tools, including checklists, and a script to the healthcare provider
- Education for registered nurses
- Information about the medication direct to the patient

Risk to the patient is effectively reduced by clearly defining what everyone needs to do and when they need to do it to avoid possible failure at each step of the process.

FMEA in REMS design validation

The FMEA methodology also has proven to be useful in validating a REMS design. In one case, an organization's employees had brainstormed to identify what they thought were 30 of the most effective risk-management tools for addressing possible points of failure during use of their medication. Using intuition is rather common, but they wanted to use FMEA to validate their selections and the applicability of the tools.

When the organization's processes were analyzed and the 30 tools were applied in accordance with the FMEA method, it was found that only 16 of the processes, or 55%, were relevant. The remaining 14 were not relevant to mitigating high-priority risks in the medication-use process. The use of FMEA also identified 12 new tools that had not been contemplated based on intuition, but which were deemed necessary once a standardized risk-management methodology was applied.

The 28 relevant tools were then consolidated and distributed across four key stakeholders to assure redundancy. This reduced the burden on the prescriber, accounting for possible human factor failures.

Key lessons learned from using FMEA to validate REMS design include:

- Intuitive brainstorming, while common, may be highly inaccurate, can lead to waste and leave gaps.
- Applying a standardized risk-management methodology can generate a more focused program design with fewer, more targeted tools.
- Redundancy of design alleviates the potential burden on the healthcare provider.

FMEA in REMS re-design

FMEA has even been used to re-design existing REMS with Elements to Assure Safe Use (ETASU), which requires the establishment of a process to verify patient compliance with protocol. The systematic approach identified the high-priority hazards in the use of extended-release and long-acting opioids. It also demonstrated how an education-based program could be designed to be effective in mitigating medication risk. The analysis generated a robust set of educational interventions that were included in a revised REMS and as voluntary activities to support safe use of the medication.

THE OUTCOME

Benefits of FMEA

In all use cases, the FMEA experience creates internal team consensus by enabling a diverse set of functional experts to work together within a common framework. FMEA defines a prioritized set of failures and causes that cuts across all therapeutic areas, setting the stage for developing a standard set of risk-management tools over time.

Moving these tools forward is important, timely and now possible via the insights derived from FMEA. It will require a collaborative effort among regulators, healthcare providers and technology providers to design, validate and deliver such tools to the point of care. It will also take time to move from the current ad-hoc practice to the point where standardized analytic methods, such as FMEA, and standardized tools, such as checklists, are the norm rather than the exception.

Regulators worldwide are looking at FMEA as a possible systematic approach to standardize the design and implementation of risk-management programs. This past July, the FDA held a public meeting on the topic of Standardizing and Evaluating REMS. In the introductory comments, the FDA stated its intention to work with stakeholders to identify "methods to assess and characterize risks and select appropriate REMS tools or interventions, [such as] Failure Mode and Effects Analysis."

FMEA has proven its effectiveness in risk-intensive industries, and recent case studies demonstrate its value in the biopharmaceutical sector. Intuitive design has its place, but where patient safety is concerned, a more rigorous and systematic method for risk-management is long overdue.