Training, Retraining, and CAPA—A Root Cause Analysis View

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INTRODUCTION

Many investigations end with the preventive action of corrective action and preventive action (CAPA) being retraining. If a sterile product repeatedly fails sterility testing we would quickly come to the conclusion that there is something wrong with the sterilization process. If a recently developed modified-release tablet frequently fails to meet its dissolution profile, we would start to question the development process—we would be talking in terms of design space and quality by design, and we would be concerned about the technology transfer process.

However, companies are quite content to see “retraining” as a repeated response to a CAPA. Training is a process that is not dissimilar to pharmaceutical processes. Regarding the “process” of training, a simple work breakdown structure might well include the following:

• The collection of material (information)
• The processing of this material into an appropriate form taking into account both the quality and the acceptability of the material that has been prepared
• The transfer of this by appropriate means to the trainee.

Pharmaceutical processes are subject to stringent controls that are validated; trained operators then perform the validated processes. In contrast, most companies allow their training problems to operate without quality attributes or specifications.

Training is an essential part of the quality management system, and the training processes should be subjected to the same rigorous quality standards that are applied to other pharmaceutical processes. The policies and directives of upper management often greatly influence the performance of training. Availability of training personnel, resources, timing constraints, and other considerations controlled by management have a significant effect on the training effort.

This article addresses the issues related to training and retraining in terms of conventional quality management and root-cause analysis.
TRAINING AND RETRAINING
The ICH Q9 Quality Risk Management (1) essentially only contains the following instructions regarding training:

“Under a quality system, managers are expected to establish training programs that include the following:

• Evaluation of training needs
• Provision of training to satisfy these needs
• Evaluation of effectiveness of training
• Documentation of training and/or retraining.”

Many years ago a colleague of mine at university had a sign on the door of his laboratory that read: “Search-to look for something. Research-to look for something that you once had and have now lost.” Using a similar approach, we must assume that retraining means that either the individual did not successfully complete the training or, if successfully trained, has not managed to retain the information gained during the training.

An out-of-specification investigation finds that the analyst made an error, an operator did not follow instructions correctly, a purchasing officer bought the wrong material; all of these are likely to end with the preventive action being reported as retrain. This retraining may be individual or general depending on the quality assurance (QA) unit’s estimate as to how widespread the problem may be.

Many investigations carried out under CAPA result in the corrective action being retraining. However non-specific recommendations normally indicate that the root cause of a problem has not been identified. Furthermore, as root causes are, in most cases, a reflection of company or corporate policy, it is apparent that retraining is not a logical end of a CAPA. If the analyst, operator, or purchasing officer needs to be retrained, then we must ask the question, why do they need retraining?

ROOT CAUSE ANALYSIS AS APPLIED TO RETRAINING
Most pharmaceutical companies have some form of CAPA system, no matter what regulatory jurisdiction they fall under. It may be relatively simple, as in carrying out investigations arising out of deviations in production or complaints received. Most techniques describe unwanted events as being caused at the following three causal levels:

• **Proximal or presumptive cause.** The most direct and obvious cause of an adverse event.

• **Contributing or accompanying factors.** These are causes which by themselves would not have caused the problem but are significant enough to be considered as indirectly responsible.

• **Root cause.** The most basic reason for the occurrence and the one that, when corrected, will prevent the problem from reoccurring (i.e., the underlying cause) and is characterised as underlying causes that can reasonably be identified; that management can have control over; and, for which effective recommendations can be generated.

The term “root cause” occurs frequently in quality documentation, in audit reports and #483s. Regulatory authorities are concerned that companies are failing to investigate sufficiently and that CAPA fails to establish root causes. The US Food and Drug Administration’s Inspections Operations Manual (2) states “If FDA learns of a potentially violating product which may lead/has lead to a class I or significant class II recall, an inspection should be made to determine the root cause(s) of the problem(s).”

Further, subsection 7.2.1, “Inspection Procedures,” requires the inspector to check not only that the firm has carried out a root cause analysis, but also verify any findings of such analysis. “An important part of your job is to identify the root cause for the recall and assure the firm has implemented procedures to prevent it from reoccurring. In some cases, management will have conducted its own analysis and reached conclusions about the problem and its cause. The initial judgments about the problem are not always correct nor are they discriminating enough to identify the underlying causes. You need to verify the steps taken were sufficient in depth and scope and reflect the correct conclusions about both the problem and correction.”

This highlights one of the problems of root cause analysis, namely how to know when one has actually arrived at the root cause. Root cause analysis techniques are many and varied but all start with an
examination of processes. The general sequence for root cause analysis is the following (3):

- Identification of the problem
- Evaluation of the size of the problem (risk analysis)
- Investigation and assignment of responsibility
- Analysis and documentation of the root cause.

One of the most important aspects of root cause analysis is collection of data. An important stage in this is the interview process with the people involved. If we look at this in terms of effective training, any quality training system should include a detailed evaluation based on interviews with the trainees. Most companies either have no feedback mechanism or, at best, the completion of a questionnaire asking for ranking of the presentation. What is done with this questionnaire remains a mystery known only to the human resources department.

ROOT CAUSE ANALYSIS OR INCIDENT ANALYSIS

Root cause analysis is a structured evaluation method that identifies the root causes for an undesired outcome and the actions adequate to prevent recurrence. Root cause analysis should continue until organisational factors have been identified.

Root cause analysis is an exhausting process that is not routinely nor efficiently practiced across the industry for the following reasons:

- It is time consuming
- It is almost certainly interdisciplinary
- It is difficult to carry out in many organisations that still operate under a “who is to blame?” philosophy
- It takes intensive training or good intuition to be able to carry it out effectively.

In addition, root cause is almost always an organisational factor; equipment failure is a proximal cause, inadequate maintenance and repair systems might well be a contributing cause, and a management decision to cut back on maintenance costs would be the root cause. In a system in which the finger often points back at the management as responsible, it is not surprising that there is often a lack of management support for the full introduction of root cause analysis methods.

More frequently what companies undertake is an incident analysis that is designed to determine the cause for a specific event. This approach rarely results in identification of the true root cause. One may liken incident analysis to the treatment of the symptoms of a disease rather than treating the disease itself.

Some typical examples taken from published FDA #483s include the following:

- “Failure to determine the root cause of out-of-specification results and take appropriate corrective action undermines any assurance that your manufacturing process is in a state of control and consistently produces drug products that meet their specifications and quality attributes.”
- “Your investigations are incomplete in that they did not identify a root cause for the virus inactivation failures...”
- “Please include in that description how you will use all relevant information to conduct root cause analysis, to ensure that adequate steps are taken to evaluate whether deviations impact product, and to implement effective corrective and preventive actions.”

The repeated finding that an adverse or unwanted event simply requires retraining is an indication that the analysis of this event is the result of an incident analysis rather than root cause analysis. The question that should be asked is “what was wrong with the original training and how was this related to company procedures?”

TRAINING INADEQUACIES AND ACTUAL EXPERIENCES

The potential for training inadequacies is large. Some of the more common issues experienced by the author and colleagues include the following:

- Attendance
- Training and change control
- Does the trainee actually understand the training?
- Effective training with no reinforcement
• Mass training and re-training
• Appropriate training
• Read-and-sign large numbers of documents

Attendance
Firstly there is obviously the need to make sure that all operators were actually trained in the first place. This requires that there must be a tracking and monitoring system dealing with vacation and absence on the day of the training. This can be a problem with outside training courses but most company-based courses deal with this adequately.

Example: I have given training courses and been presented with a list of names to sign off only to discover that the number of people on the list did not tally with the number actually present. Commercially-organised training courses may give out certificates, sometimes in a language foreign to the instructor and certainly with no way of identifying the participants. In one instance I discovered that I had been presented with a certificate to sign for a non-participant on the grounds that she had paid for the course but had been taken ill and could not attend.

These situations can be remedied by requiring those in attendance to sign documentation affirming their presence. Alternately, those not present may be “lined-out,” thereby creating an accurate record of attendance. The organization’s approach to attendance and lack of concern for absent individuals demonstrates a lack of respect for the importance of training. More importantly, falsified training documentation constitutes fraud.

Training and Change Control
Within companies, introduction of a new process, procedure, standard operating procedure (SOP), etc. is normally well controlled, but the requisite training on modification of the SOP is not as rigidly enforced. Frequently, training stops with distributing the new version of the SOP and the requirement that an operator sign that they have read and understood the change. Such procedures show that documentation control is part of the change management process, but retraining is not.

Example: In a recent audit I examined the training records and noted that an operator had been trained on 19 SOPs in one day. When challenged, QA advised that they had two levels of training, one where the SOP was given to the trainee to read and one where they actually received instruction. Apart from the fact that the recording system did not distinguish between the two types of “training” it is evident that neither approach is acceptable because there is no feedback mechanism to establish the adequacy of the training process. In this case, the majority of deficiencies found during the audit could be related back to corporate policy rather than the incompetence of staff. In other words, the root cause of the quality issues in the company was management policy rather than the individual errors that were found as proximal root causes.

Does the Trainee Actually Understand the Training?
This can be a case of language barriers—outside trainers running courses in English to staff that are not fluent in the training language. Even the use of translators may be problematic because of the technical nature of the subject material. Sometimes it is not the actual language but the use of language that is the problem. To effectively transmit information it is essential that the choice of terminology and complexity of sentence structure is aimed at the audience and not at impressing senior management. To be told that something may cause a conflagration is not going to impress cleaning staff and by the time they find out what it means it could have changed from a minor incident into a major fire.

Professional translators should be provided with the written documentation well in advance so that they can check on any technical terminology. They should be encouraged to check with a bilingual pharmacy professional in case of doubt. Particularly, more philosophical subjects may present difficulties. The difference between risk avoidance, risk amelioration, and risk mitigation is an example where imprecise translation can cause confusion.

Example: While organising a work trip in Poland, I was told by my secretary that the company I was to visit would only pay for my trip back and not both ways. I was very upset until I realized that the quite uniquely British English expression “a return ticket”
will confuse those whose language require you to have a ticket for “a round trip” or “there and back.”

As a side point related to overseas training, the trainer should establish whether there will be translation and whether it will be simultaneous or non-simultaneous. These factors dramatically affect the amount of material that can be covered in a specified time.

Effective Training With No Reinforcement
Sometimes the training course is in contradiction to existing practice within the company. This is not an uncommon experience, particularly where companies are attempting to upgrade from less regulated to more regulated markets. Very often the management itself generates schizophrenic situations, while encouraging the new philosophy and training. The minute there is a conflict due to the new situation, the tendency is to revert to the old practices. The major upgrading of a facility is an extremely difficult process and requires extremely careful planning of all training programs. To some extent the trainer is in a chicken and egg scenario. Training to a new level of compliance before the new quality management system is in place is a poor way to implement change. On the other hand, you cannot implement the new management process until the people have been trained. In such a situation a fully-integrated and project-based training program needs to be introduced with a clear agenda and transparent timetable.

Mass Training and Retraining
Training is an important responsibility. A training meeting presented in a theater setting may be appropriate for certain applications or in certain circumstances, but has limitations. A setting in which literally hundreds of people are seated in a darkened facility for a prolonged period at the end of the workday is probably appropriate at most for awareness training—making people aware of the availability of policy or information. Expecting the details of training conducted in this type of setting to be retained and effectively practiced are unrealistic expectations. Trainers are the best qualified to know whether their style and course structure are suitable for large or small groups and should determine the number of people present. It is not unusual to arrive to give a training course designed for a small group and discover that twice or three times the number of trainees is in attendance. Subjecting this to root cause analysis will normally reveal that the reason behind this is a management decision to cut costs by training as many people at one time as possible. In other words, the root cause is a management attitude of training value being reflected in quantity rather than quality.

Cultural Aspects of Training
There are many cultural factors that should be factored into training efforts. Certain cultures respond well to interactive training and will respond well to open discussion and controversy; whereas, other cultures would regard this as lacking in respect for the presenter and asking questions would not be appropriate. Some countries accept e-learning processes, yet others do not accept e-learning. The cultural differences can go as far as to affect critically the amount of information that can be transferred in a unit of time and from personal experience: A two-day course in one country needs three days in others, reflecting the difference in passivity and activity of the participants.

Appropriate Training
Training may not be appropriate for a specific task. Training for operational tasks must include actual performance of the specific task. For example, can you learn to wet granulate a powder blend by reading how to do it? Or more fundamentally, can you learn to ride a bicycle by reading a procedure? Training for performance of operational tasks is optimally performed in a series of sessions beginning with demonstration by a task expert and finishing with complete independent performance by the trainee.

“Read-and-Sign” Large Numbers of Documents
New company personnel or personnel new to a function may be required to read and sign literally hundreds of procedures to complete training before
they are able to start work. They are required to do this on their first days in the new job. The employee may not even have visited the departments or seen the equipment referred to in these documents. However, according to the system he is considered qualified to perform the requirements of his new job. If an error is made, the CAPA response is “retraining.” But was this individual actually trained? This type of training demonstrates a gross violation of the spirit of training.

TRAINING THE TRAINER
Most of us have suffered from lecturers who may have been brilliant in their own fields of expertise but have been completely incapable of communicating to the students. Internal trainers within a company are frequently the experts in the subject but may have little or no training skills. They will have been selected and promoted for their technical competencies and not their ability to teach and train. Often these people regard having to run training courses as a distraction from their main job. Management often supports them in this view. It is rare to find the inclusion of effective training performance within senior and middle management key performance indicators. Although we are happy to send people on technical training courses, there is considerable reluctance to support training courses for trainers. There are training courses that can deal with simple fundamentals that allow such people to become more proficient; how many data points can one put on a single slide, how to construct a training course, even how to speak slowly and clearly are all relatively easy fundamentals that can be taught. An extremely valuable part of such training for the trainers is to videotape the trainer. Nothing is more revealing and sometimes embarrassing! Such simple courses are of immense value, both in terms of the actual training given and in the clear message from management that training is an important part of the person’s job description.

Trainer IQ/OQ/PQ
The approach to qualifying equipment, facilities, and utilities (i.e., installation qualification [IQ], operational qualification [OQ], and performance qualification [PQ]) might be conceptually applied to training personnel. When ordering new equipment, the first stage is the issuing of a user requirement specification (URS). The URS is constructed by the experts in the field and is designed to make sure that the purchasing department will buy a product that will serve the purpose for which it is intended. In commissioning outside training, the process would well benefit from the same approach. However, in most companies, courses are commissioned by passing the message to human resources that “we need a training course on ……” Individuals that conduct training, including classroom presentations and on-the-job (OJT) training, should possess fundamental qualifications (i.e., IQ), have acceptable communication and presentation skills (i.e., OQ), and demonstrate proficiency in the actual training circumstances (i.e., PQ). The “IQ” of a trainer includes education, experience, or equivalent fundamental qualifications upon which the actual presentation of training is based. The “OQ” of a trainer includes the ability to present training including presentation skills, language skills, and so on. The “PQ” of training includes the ability to interact with trainees and maintain attention of trainees. While not advocating the use of IQ/OQ/PQ documentation for trainers, applying the concepts of qualification to trainers is certainly reasonable.

MEASURING TRAINING PERFORMANCE
Measurement of training performance is an extremely complicated and largely subjective issue. The following are two main schools of thought:

• The academic approach—recording attendance. This approach relies on the traditional methods of certification, tests, records of completion, and frequency of training. This is an approach that has stood the test of time and demonstrates the performance, at least in theoretical terms, of the training at the time it was carried out. It does not give any indication of the trainee’s ability to retain the information or to apply it in a practical situation. The biggest downside to this approach is the need to set up a test system that puts further pressure on the trainer both in terms
of setting the questions and then marking them.

- **The pragmatic approach—monitoring effectiveness.** This approach states that the true indication of performance is demonstrated by effectiveness (i.e., demonstrated by results). Continued vigilance and inspection linked to a reduction in compliance issues is thought to be the best way to demonstrate effective training. The *Medical Device Quality Systems Manual* (4) actually lists both a range of training methods and training indicators and states “A proactive approach to training is required by 820.25(b) where each manufacturer is required to establish procedures for identifying training needs. Thus, management should diligently look for factors that indicate a need for additional training or retraining.”

However inspection of the list of training indicators shows that they are all reactive rather than proactive; that is, they highlight the types of failures that indicate that training is ineffective rather than look at measures that can be taken at the time of the training to ensure that it is effective. As with most things, a combination of both systems is the most desirable.

**CONCLUSIONS**

Training is a major investment in time and energy for all pharmaceutical companies. Training is a process that can be broken down into individual tasks and phases. However, whereas most pharmaceutical manufacturing processes are subject to a rigorous evaluation, the training process is left uncontrolled and unsupervised. As a result, CAPA investigations frequently end with the recommendation to retrain the staff involved. Frequent failures in any other area of the pharmaceutical industry would definitely require investigation and the application of root cause analysis.

Training programs should be subjected to the same quality criteria as the issues they are designed to cover. It could also be relevant to look at the trainers themselves in terms of IQ/OQ/PQ.

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**REFERENCES**

1. International Conference on Harmonisation, *ICH Q9 Quality Risk Management*.

**ARTICLE ACRONYM LISTING**

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<tr>
<td>CAPA</td>
<td>Corrective Action and Preventive Action</td>
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<td>IQ</td>
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<td>Standard Operating Procedure</td>
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