Why Is Quality Control in Research So Important?

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Quality control can mean the difference between good science and bad science. So, what is quality control? Very simply, it is any process that aims to monitor and maintain laboratory standards.

The processes of quality control can include detecting, reducing, and correcting any problems within a lab. Quality control can also help to make sure that the results of an experiment or method are consistent. Quality control is known as quality assurance or quality management.

Good Laboratory Practice (GLP) is one form of quality control. GLP was introduced in the field of chemical research, to try to ensure high quality, reliable test data. This was a good starting point. However, it was not perfect.

What is the Best Type of Quality Control?

The best practice for quality control is a Laboratory Quality Management (LQM) program. The design of LQM helps control factors that cause variation in a lab. By doing this, an LQM can increase the researcher's confidence in the results of their experiments.

An LQM has six vital parts:

1. Quality manual
   - Labs should have a manual that describes its quality control systems in detail.
2. Staff and training
   - Training for all staff should be thorough and consistent.

3. Methodology
   - The method must be consistent throughout the lab. They should be validated to check that they are precise and accurate.
4. In-house reference materials
   - This means that labs can have their control samples for standard methods. These samples will have known properties. They can be used to check that methods are working correctly.
5. Record keeping
   - Write down the preparation, procedure, and analysis of the experiment
6. Cost vs. benefits
   - The prices of setting up an LQM should be low. Benefits include confidence in results, fewer problems, and lower costs.

Tackling Problems in Quality Control

In a *Nature* article, a scientist describes her experiences with quality control. Rebecca Davies manages quality control at her lab for a long time. Although her task was huge, she soon became hooked on finding and fixing problems.

Once she started looking, Davies found several problems. These ranged from issues with sample storage to issues in data collection. She also discovered faulty equipment and spotted missing controls. However, these problems did not put Davies off. Instead, she realized how much the lab's work could improve.

In 2009, Davies set up a group called Quality Central. The group helps several research labs to design proper quality control systems. Along with some other scientists, Davies believes in “voluntary” quality assurance (QA). Voluntary QA does not force quality control through regulation. Instead, it helps scientists to strengthen their research with QA.

What Happens when Quality Control is Poor

Scientific rigor is a hot topic. Over the last few years, several issues in science have caused both researchers and the public to question the scientific process. For example, some studies have found that as few as one-third of scientific papers are reproduced. Peer review and plagiarism have also been a problem. Among researchers, there is a general opinion that publications are of more value than the science itself.

Many scientists are cautious in their work. However, some are careless. Failing to record data, writing reports months after the experiment and not using controls are just a few examples. Each of these may seem like a small problem. But together, they can lead to studies that cannot be reproduced.

We can fix a lot of issues with better quality control. Unfortunately, many labs still carry out quality control in a casual, ad hoc way.

Barriers to Good Quality Control

In many labs, quality control is not seen as the best use of resources. With limited funds, other things can take priority. Some scientists explain that a lack of quality control is due to both lack of funds and lack of staff.

When Davies first set up Quality Central, she found that other researchers at her college were not interested. They thought that it was not essential, and so was a waste of time and money.

However, one scientist was interested. The researcher had used another lab’s equipment, but the results seemed odd. She discovered that to save money, the PI of the lab had not been maintaining the equipment. Equipment maintenance is one of the things that a good quality control program should check

The Benefits of Great Quality Control

Thanks to the efforts of Davies and others, researchers are starting to understand the benefits of quality control.

Quality control does not need to be complicated. Here is one example. Notebooks checking is a weekly task in a laboratory. To make sure this is fair, each member of the lab draws a name from a paper bag to decide whose notebook they will check. Notebooks include factors such as whether control was used, how and where data was recorded, and which equipment was used. Any previous problems should be fixed. This

is a tremendous low-tech quality control system.

Some PI's with large labs find it hard to check everyone's work. It can be challenging to track samples, data, and equipment. One solution is a tracking system. This gives tracking numbers to every sample or data record. PI's can then easily follow the progress of a study.

Often, researchers only realize the benefits of quality control when problems occur. Unexpected results can mean searching through stacks of data to try to find the cause. With reasonable quality control, this should be a rare event. Moreover, if it does happen, the reason should be easy to find.

Do you want to learn more about running a lab? Alternatively, finding and fixing problems? Why not start with this Enago article on GLP.

What are the quality control systems in your lab? Has your work ever suffered from poor quality control? Do you have any suggestions for improvement? Share your ideas in the comments below.

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