

## Quality in the small laboratory

June 2001



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### How do small labs cope with the demands of modern quality assurance?

In this interview, Ruth Lock, head of the laboratory of the Anesthesiology and Intensive Care Dept. of the Copenhagen County Hospital in Glostrup, Denmark, tells how her lab keeps up with demands with the help of training and quality control.

**Acutecaretesting.org:** Ruth Lock, please tell us about your background.

**Ruth Lock:** I have a lab technician degree and 30 years of experience as a laboratory worker. Today, I work as the head of a small laboratory. We are two lab technicians.

The intensive care department is rather small with just 8 beds. However, they do a lot of operations, so there may be analyses before the operation, during, and after. We also used to do the tests for the neurosurgical department. Totally, we do about 45 tests per day on our blood gas analyzer.

**Acutecaretesting.org:** You must have experienced a tremendous development in the past 30 years...

**Ruth Lock:** Yes. Nowadays you can get all the results - pH/blood gases, oximetry, electrolytes, metabolites - from just one capillary sample. When I was a student 30 years ago, you took five very large capillary samples just to get pH and  $p\text{CO}_2$ .

If the patient was very ill so that you needed saturation as well, you took another three capillary samples - and the tests took 1½ hour to complete. Alternatively, the physicians took a syringe sample, 20 mL from femoralis!

**Acutecaretesting.org:** Are there any other people that use the analyzer in your laboratory?

**Ruth Lock:** Yes. We train all the operators in the proper use of the analyzer. Actually, there are about 150 nurses and 100 anesthesiologists who have been through the training. They especially need to know about the preanalytical phase.

It does not help to have an analyzer that is good for three decimals, if you lose the first two in the preparation. The nurses are all equipped with an individual code that they must key in if they want to get the results out.

Many have tried to get around that, but without success. Experience has taught us that it works best when each person is responsible for his or her own results. They all know the set of rules to follow.

We are ahead of the other departments with respect to blood gas equipment. If the equipment breaks down, we have no immediate replacement.

That is one more reason why we must be so strict about how it is used.

**Acutecaretesting.org:** How do you train the physicians and the nurses?

**Ruth Lock:** Each member of the staff goes through a two-hour session with me where we cover all aspects of the test.

I have written a book about it. Every aspect of the test is covered, from the patient being in a stable condition to sampling, what records to make, how the analysis is done, and how the data is brought back to the physician.

**Acutecaretesting.org:** Do the nurses find it difficult to follow the instructions with respect to sampling?

**Ruth Lock:** No, but some physicians do. But then again, they have not followed my training.

They still might just take a single-use syringe and some liquid heparin without thinking about the dilution effect, especially on the electrolytes.

**Acutecaretesting.org:** Who has taken the organizational initiative for this arrangement?

**Ruth Lock:** I have, but with management's full support. They wholeheartedly back me up.

**Acutecaretesting.org:** What records do you require from the patient?

**Ruth Lock:** Name, identity number, age, sex,  $FO_2(I)$ , temperature, time. These are necessary to include the reference ranges that occasionally depend on sex and often on age.

I have had people call me in the middle of the night saying that the analyzer does not work, because they did not get any results out. The reason for that is that I have made these entries obligatory to force people to enter them.

One more thing to remember is the operator's code number. Without that, you will not be able to aspirate your sample. You might ask why the patient ID is necessary when you just walk right up with the sample, analyze it, and walk right out again.

Well, sometimes this happens right at the time the new shift turns up. How would you like to depend on a slip without the proper name on it?

**Acutecaretesting.org:** How are tests ordered?

**Ruth Lock:** Usually we are there because we know when a patient is critically ill.

Otherwise we are called: 'Be there in 10 minutes', for example. Then it should be exactly 10 minutes - the time interval is essential, because the patient should be stable.

**Acutecaretesting.org:** Do you always take one sample at a time?

**Ruth Lock:** No, only in acute cases. Normally, we take three-four samples.

**Acutecaretesting.org:** How are syringes marked?

**Ruth Lock:** We mark every syringe with a label slip with the name and ID number of the patient. Each patient has a number of these slips next to him. Unfortunately, we still do not have bar code reading; that would be nice.

We then write the extra information on the slip. The syringes are kept refrigerated. We are very strict with the time: no more than 10 minutes at room temperature or half an hour refrigerated.

**Acutecaretesting.org:** How do you ensure the results of the analysis itself?

**Ruth Lock:** We rely on our quality control results. We have to be strict: if there is a value for some parameter outside the permitted interval, that parameter cannot be reported until it is inside again!

So, if  $cCa^{2+}$  or  $pCO_2$  are judged 'out of order', people cannot say, 'Well, it looks OK to me' because the figure is not there. It is simply suppressed until the quality control is OK again. That is really a great security.

**Acutecaretesting.org:** Is it your impression that your laboratory is standard? I mean, are other laboratories just as strict?

**Ruth Lock:** No, I am sorry to say that it is my impression that very often the rules are more lax.

For example, you are told that the hemoglobin does not measure correctly. My 30 years of experience leads me to say that in 99 % of the cases that is an operator problem: they simply haven't rotated the sample sufficiently.

The law of gravity also applies there. But you must remember that often the nurses are forced to do the maintenance and testing as an extra job, even though they have little training in doing it.

In my opinion the best would be to have properly trained personnel taking care of the analyzers.

**Acutecaretesting.org:** How are the results brought back to the requesting physician?

**Ruth Lock:** We walk – but we are working on a new system that will ensure automatic transfer of the results to a bedside monitor. It is called PDM, short for Patient Data Management system.

The request will be keyed into the system simultaneously with the analysis. When the result is ready, the responses are OK'ed and the data are transmitted to bedside.

The operator is registered and is responsible for the quality of all parameters, also the ctHb that is low/high due to inadequate mixing! This system should improve the patient identification and the general quality of the blood gas analysis.

**Acutecaretesting.org:** What are your thoughts on monitoring the analyzer through such things as proficiency testing and daily average monitoring?

**Ruth Lock:** It would be a good thing if the quality control results from the analyzer were monitored in a comparison program.

It ought to be obligatory where the analyzer's performance cannot be easily compared with that of others! I have seen cases where the results disappeared without anyone caring.

The analyzer gave out figures, didn't it? It was quite a catastrophe.

## Interviewer

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