

might well be the same for the same control material, but this manual lab could have SDs of 3.5 – indicating that its performance was not as good as that in the first lab.

To summarise, the mean is what statisticians call the measure of central tendency, and is therefore related to the accuracy of a method, or how “correct” it is. In contrast, standard deviation is a measure of the width of the distribution or dispersion of results, and is related to imprecision or random error. Remember, the wider the SDs, the more dispersed the results, and the greater the random error and the poorer the precision of the method i.e. the greater the analytical variation. And that brings us to one more definition, that of Coefficient of Variation, CV.

*Coefficient of Variation (CV)*

CV describes the standard deviation as a percentage of the mean, as shown in the following equation:

$$CV = \frac{SD}{Mean} \times 100$$

The multiplier 100 is used simply to convert the ratio to a percentage. Like SD, the smaller the CV, the better an analyte is measured.

Standard deviation often changes with concentration, and thus a “large” SD might simply be related to the concentration of the analyte being measured.

**CPD Questions:**

6. **If a control sample has an SD of 0.2 for Analyte X, does that indicate that Analyte X is better performed than Analyte Z where the control has an SD of 2.0? The answer to that apparently simple question is: it depends. If the control has a mean value of 5.0 for Analyte X and a mean value of 100 for Analyte Z, what are the relevant CVs? Which method is better performed?**
- A) **The method for Analyte X**  
B) **The method for Analyte Z**

To return to the two labs measuring the same control, if both labs followed the system described here and created Levey-Jennings charts with their own +/- 2 SD ranges, then they would look fairly similar, and each would or should have the same percentage inside and outside the various ranges, with approximately 5% outside the +/- 2 SD ranges in both labs. And yet they are using very different control limits.

This begs the question: are the SDs you calculate good enough?

This topic of what constitutes good or acceptable quality standards will be much discussed in Module 3. The fact is that it is not possible to simply use your own SD limits without checking on how appropriate they are in a clinical sense. It is futile to try and