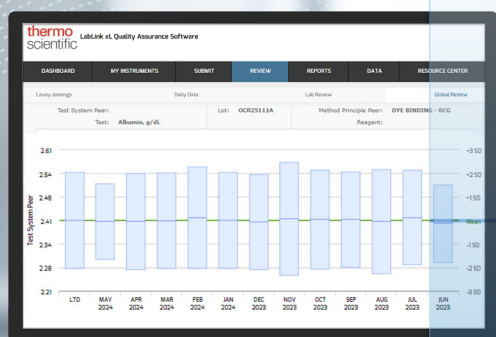




Quality controls

Peer group comparisons

When size matters (and when it doesn't)



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Here's a quick quiz about the size of a peer group

Which range gets you closer to the actual mean of the method?

- From 10 to 15 peers, or from 50 to 100 peers?
- From 15 to 20 peers, or from 100 to 200 peers?
- From 20 to 30 peers, or from 1000 to 2000 peers?
- From 19 to 20 peers, or from 2000 to 3000 peers?

As you might suspect, the answer to all of the above questions is the former, not the latter, even though the latter represents far larger numbers.

This simple exercise reveals a truth not often recognized in peer group programs: size does not always matter. The typical laboratory searching for a peer group program scrutinizes the peer group size. Bigger can be better, yes. But there are significantly diminishing returns on the benefits of more peers.

What are the benefits of a larger peer group size?

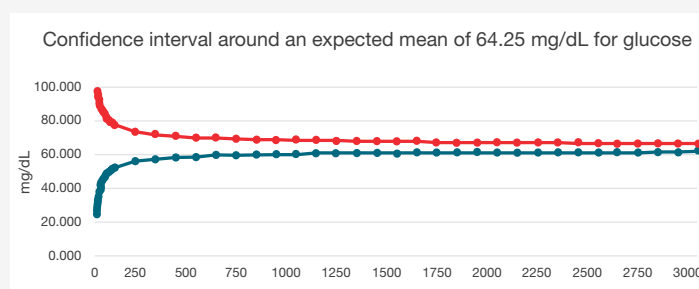
Misery loves more company? No, there's an actual statistical reason: as the number of measurements increases, the confidence interval around the value decreases. The smaller your confidence interval, the more confident you are that the value you have obtained is correct. Smaller peer group sizes result in larger confidence intervals, meaning there is greater uncertainty.

However, these gains are not linear; each additional data point has less and less added value, and the confidence interval plateaus. Even hundreds or thousands of additional measurements provide little-to-no additional benefit. All the biggest gains occur with smaller numbers, and after a certain point, there's not much need for more measurements or peers.

Chemistry QC - Glucose: 51.4 - 77.1 mg/dL

Here's an example, adapted to a glucose method with a range of 51.4 to 77.1 mg/dL, with an expected mean of 64.25 mg/dL.

By generating random numbers and taking measurements by intervals such as 10, 20, 30 to calculate mean; and then also calculating the confidence interval around the mean, we see steep gains and curves in the first 250 measurements. Then the curve flattens out. Soon, the intervals look more evenly spaced and appear to be straight horizontal lines.



Let's return to the opening quiz

Note that in simulations, the different random numbers generated will produce small fluctuations in the exact improvement.

- An increase from 10 to 15 peers will get 14.8% closer to the mean, while an increase from 50 to 100 only gets 8.4% closer
- An increase from 15 to 20 peers will get 7% closer to the mean, while an increase from 100 to 200 peers only gets 5.7% closer
- An increase from 20 to 25 peers will get 4.9% closer to the mean, while an increase from 1000 to 2000 peers only gets 1.8% closer
- An increase from 19 to 20 peers will increase the confidence by 1.1%, while an increase from 2000 to 3000 peers will only decrease the confidence interval by 0.8%

Think of it this way

- When you're at 10 peers, an additional 5 peers now is worth more than 50 peers later
- When you're at 15 peers, an additional 5 peers now is worth more than 100 peers later
- When you're at 20 peers, an additional 5 peers now is worth more than 1,000 peers later
- Even the seemingly minor increase from 19 to 20 peers is more powerful than getting 1,000 more peers later

Conclusion

Yes, more peers matter and are helpful. But bigger is not always better, since the returns increasingly diminish as the peer group size increases. Increasing from 10 peers to 20 peers carries a lot more immediate benefit than asking for another 100 or 1,000 laboratories beyond a certain point.

Peer groups can be "small" and still provide a big return on your investment. It's what you do with your peer group comparisons that can be more important.

Learn more at thermofisher.com/masqc

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