

IS SYRINGE SAMPLING PERFORMANCE RELATED TO ITS VOLUME ?

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Introduction :

For the dilution of injectable drugs, it is recommended to use a syringe with a capacity and precision adapted to the volume to be withdrawn. Some syringes have different capacities but identical precision (0.2 ml for syringes of 5 and 10 ml, 1 ml for those of 30 and 50ml). For a same volume of sample, several syringes should be adapted. The aim of this work was to evaluate if there was a difference in precision between 5 and 10 ml syringes and then 30 and 50 ml. We also assessed the accuracy of 60 ml syringes for sampling targets within 50 to 60 ml.

Material and methods :

The precision of the syringes was evaluated by the relative sampling error measured by weighing a withdrawn volume of WFI divided by the expected theoretical weight. The precision of 5 and 10 ml (BD) syringes were assessed at 2.4 and 4.2 ml, and that of 30 and 50 ml syringes (BD) at 20 and 30 ml volumes. The precision of 50ml syringes (BD) was evaluated for volumes of 55 and 60 ml by withdrawing the volume at once or in two steps (30ml + 25ml and 30ml + 30ml). For each volume 20 samples were measured with each type of syringe by 2 different operators.

The means of sampling errors between the syringes have been compared using the Wilcoxon unpaired test.

Results :

Sampling objectives (mL)	Syringes (mL)	Error (%)	p
2,4	5 vs 10	0,23 vs 2,41	<0,001
4,2	5 vs 10	-0,70 vs -2,88	<0,001
20	30 vs 50	0,26 vs 2,68	<0,001
30	30 vs 50	-0,00 vs 1,58	0,243
55	50 one taking vs two takings	0,69 vs 0,76	0,760
60	50 one taking vs two takings	0,61 vs 0,77	0,482

According to the Wilcoxon test, the means errors are not equal if the sampling targets are less than 30ml, equal if they are greater than 30mL. In any case, the error is never beyond 3%.

Discussion / Conclusion :

- ◆ For a volume smaller than 30 ml, using a syringe with a capacity closest to the volume to be sampled ensures the best precision.
- ◆ However, since the error does not exceed 3% in the use of 10 ml syringe for volume smaller than 5ml and 50 ml syringe for volume within 20 to 30 ml could be considered as acceptable as a degraded mode.
- ◆ For sampling targets between 30 and 60 ml, it is possible to use 50 ml syringes routinely and in a single dose.