**SIP-HLT07 contributions to method improvement in syringe pumps calibration**

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For more than 25 years, multi-infusion has been known to cause severe dosing errors. A great percentage of these errors can be avoided if the users of infusion technology have a better understanding of the equipment and therefore it is very important to create awareness and understanding by users of infusion technology. The goal of this EMPIR (European Metrology Programme for Research and Innovation) SIP (Support for Impact) project SIP-HLT07 is to maximize the uptake of the key outputs of the JRP (Joint Research Project) MeDD (Metrology for drug delivery).

One key output of the JRP MeDD has been the realization of calibration services for infusion devices. These services followed the design, construction and validation of several calibration facilities. Furthermore, following the show cases of calibration of infusion systems, the JRP MeDD has generated a vast experience on how to calibrate infusion devices with the lowest possible uncertainty. While this knowledge has been presented at various scientific conferences and magazines [1], it has not yet been formalized via amendments to written standards. The current available standards dealing on calibration of infusion devices (and accessories) using the gravimetric method, e.g. ISO 7886-2, IEC 60601-2-24, ISO 28620, IEC 62353, have room for improvement, especially for low flow rate calibrations, as required by the neonatal care.

Existing written standards on syringe pumps calibration do not include all correction terms for low flow rates, namely the buoyancy correction. The density formula, the number of repetitions, the uncertainty calculation and information on how to measure the water temperature is not properly taken into account. Further, written standards do not make a difference between standard and high-risk applications (neonatology) and the influence of accessories on the compliance and start up delay.

In this paper a complete calibration procedure for syringe pumps based on the gravimetric method will be described, along with the measurement system (pump generator, collecting device and data acquisition system) and uncertainty calculation parameters, in which the largest contribution is the flow stability [2].

1. H Bissig, H., Petter, H.T., Lucas, P., Batista, E., et all, Primary standards for measuring flow rates from 100 nl/min to 1 ml/min – gravimetric principle, Biomedical Engineering, 2015, 60(4)
2. Batista E., Almeida N., Godinho I., Filipe E., Uncertainty calculation in gravimetric microflow measurements, AMCTM X, 2015