

Reliability of chemotherapy preparation processes: Evaluating independent double-checking and computer-assisted gravimetric control

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Abstract

Background and objectives: Centralized chemotherapy preparation units have established systematic strategies to avoid errors. Our work aimed to evaluate the accuracy of manual preparations associated with different control methods.

Method: A simulation study in an operational setting used phenylephrine and lidocaine as markers. Each operator prepared syringes that were controlled using a different method during each of three sessions (no control, visual double checking, and gravimetric control). Eight reconstitutions and dilutions were prepared in each session, with variable doses and volumes, using different concentrations of stock solutions. Results were analyzed according to qualitative (choice of stock solution) and quantitative criteria (accurate, <5% deviation from the target concentration; weakly accurate, 5%–10%; inaccurate, 10%–30%; wrong, >30% deviation).

Results: Eleven operators carried out 19 sessions. No final preparation (n=438) contained a wrong drug. The protocol involving no control failed to detect 1 of 3 dose errors made and double-checking failed to detect 3 of 7 dose errors. The gravimetric control method detected all 5 out of 5 dose errors. The accuracy of the doses measured was equivalent across the control methods (p=0.63 Kruskal–Wallis). The final preparations ranged from 58% to 60% accurate, 25% to 27% weakly accurate, 14% to 17% inaccurate and 0.9% wrong. A high variability was observed between operators.

Discussion: Gravimetric control was the only method able to detect all dose errors, but it did not improve dose accuracy. A dose accuracy with <5% deviation cannot always be guaranteed using manual production. Automation should be considered in the future.

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