

Automated preparation of 5FU elastomeric pump. Impact on Repetitive Strain Injury risk and preparation time

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Background: Although the use of elastomeric pumps is advantageous for the patient (increase of mobility, return to home), its preparation is time-consuming and induces Repetitive Strain Injury (RSI). In order to optimize the preparation of 5-Fluorouracil (5FU) elastomeric pumps, our center has developed a specific filling system based on the use of 2 peristaltic pumps (Repeater[®] ; Baxter). One pump is for the injection of solvent and the other one for injection of 5FU. These 2 pumps were connected together with a Y-connector with 2 one-way valves (ICU Medical CH-70). To demonstrate the advantages of this new filling system, we have compared, for manual and automated compounding, the time required for the preparation and the risk of RSI.

Materials and methods: For the time-saving analysis, 6 pharmacy technicians (n=6) have prepared 2 times, 2 different elastomeric pump references (Folfusor Baxter 2C4009K 5 mL/h, Ace Medical AA2004-1-S 4mL/h) using both manual and automated filling for a total of 48 time measurements. Elastomeric pumps were filled sequentially by 150mL of solvent and 80mL of 5FU. After the manual and automated filling, technicians have evaluated both processes using a specific questionnaire, rated on a scale of 0 to 28 (28 for the most important risk of RSI). This questionnaire was inspired by the Occupational Safety and Health Administration (OSHA) checklist to detect the risk of occurrence of RSI. The risk factors evaluated were: repetitiveness, manual effort, restrictive posture (neck, shoulders, fast forearm movement, wrist and fingers) and skin pressure. Twenty-four questionnaires were completed.

Results: The average filling time was 156.8 seconds (range: 131-183) in automatic mode and 301.5 seconds (range: 277-338) in manual mode. This difference is significant with $p < 0.001$ on Student's test. RSI scores were 8.7 ± 4.5 for the automated system and 23.5 ± 2.8 for manual filling ($p = 0.002$). For all questions except for restrictive posture of neck, there is a significant difference between manual and automatic filling.

Conclusion: Our new automated filling system based on two Repeater[®] pumps, perfectly meets the objectives of saving preparation time (2 times quicker) and reducing the risk of RSI (63% decrease of the score). However, money-saving must be assessed before a routine use.