

OPTIMISATION OF COMPOUNDING ORGANISATION AFTER IMPLEMENTING A ROBOTIC SYSTEM FOR AUTOMATED PREPARATION OF ONCOLOGIC DRUGS

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BACKGROUND

The aseptic preparation of antineoplastic drugs is performed in the centralized, pharmacy-based cytotoxic drugs preparation unit equipped with a biological safety cabinet and the robotic system APOTECACHemo (Loccioni, Italy), installed in 2012. Manual and fully automated preparation run in parallel and are operated by two and one pharmacy technicians (PT), respectively. On average, the annual workload amounts to 35,000 preparations, two thirds of them are prepared with the robotic system.

PURPOSE

The aim of this study was to evaluate the working efficiency of PT after implementing the robotic system and calculate the amount of preparations to be transferred from the manual to the automated process to optimize human resources utilization.

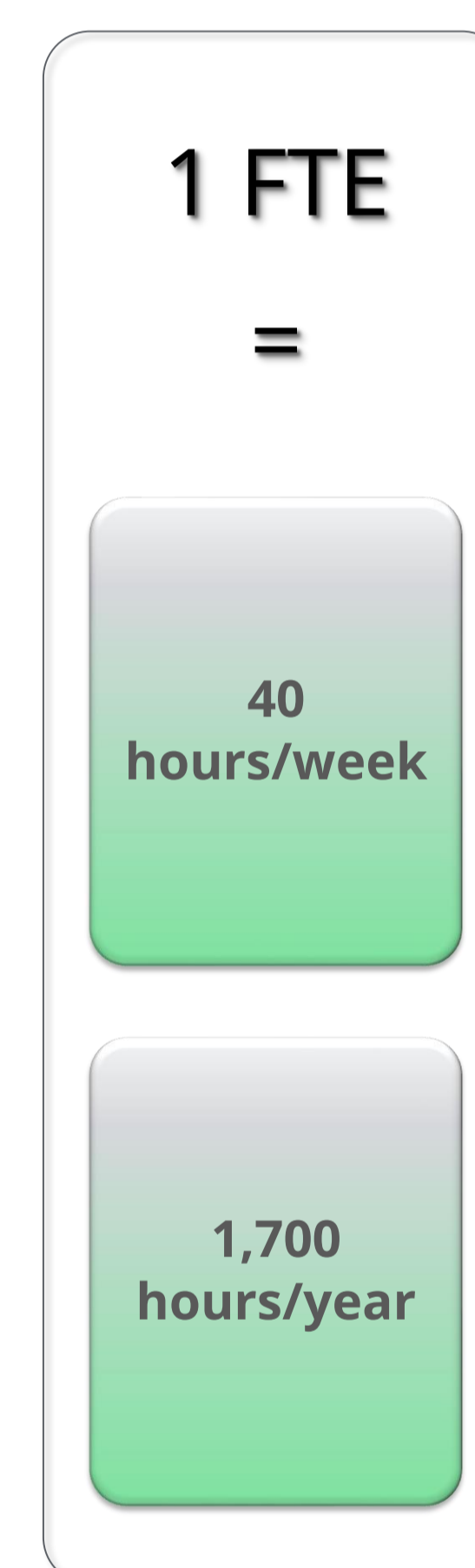


MATERIAL AND METHODS

Process activities identification and corresponding personnel involved

OPERATIONS		MANUAL PROCESS	AUTOMATED PROCESS
Compounding process	Incoming material disinfection*	1 PT	1 PT
	Incoming material identification*	2 PTs	1 PT + Robot
	Compounding	1 PT	Robot
	Gravimetric control*	N.A.	Robot
	Preparation final check*	1 PT	1 PT
	Final container labeling*	1 PT	1 PT
	Administration sheet printing	1 Ph	1 Ph
	Working sheet printing	1 Ph	N.A.
	Final label printing*	1 Ph	Robot
	Picking list generation	1 Ph	1 Ph
	* concerning the automated process, all these operations don't affect the production time since they are executed during the therapy compounding.		
Quality control	Incoming material partition and control	2 PTs	N.A.
	Drugs residues control at the end of each batch	1 PT + 1 Ph	N.A.
	Drugs residues control at the end of the entire production	1 PT + 1 Ph	1 PT + 1 Ph
Technical operations	Dressing	2 PTs	1 PT
	Equipment switch ON	2 PTs	1 PT
	Equipment cleaning	2 PTs	1 PT

Ph Pharmacist; PT Pharmacy Technician

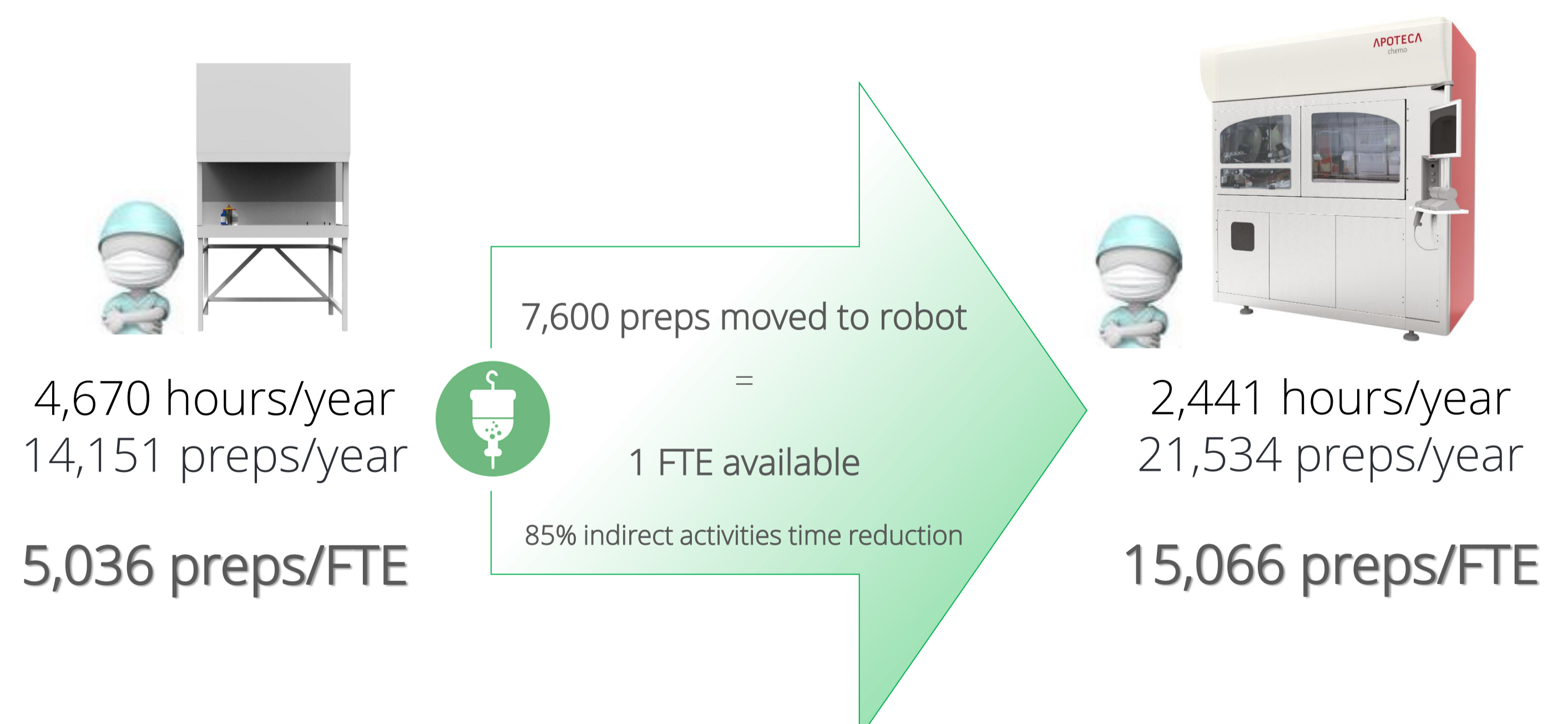


Manual and automated preparation were analyzed over three years (2014-2016). Full time equivalents (FTE) required by both processes were calculated for each year. A FTE of 1.0 was equivalent to a PT working full-time 40.0 hours per week, 1,700 hours per year.

The throughput in terms of annual preparations per FTE was calculated including direct activities (compounding) and indirect activities related to production (quality controls and standard operating procedures, e.g. cleaning and gowning). The calculation was performed for both manual and automated preparation process.

RESULTS

On average, the overall working time spent by PT on direct and indirect activities amounted to 4,670 hours/year for the manual process and to 2,441 hours/year for the automated process resulting in 14,151 and 21,534 preparations, respectively. The annual amount of preparations per 1.0 FTE in the automated process (mean: 15,066) was three times higher than in the manual process (mean: 5,036). The production times were comparable, but the working time spent by PT on indirect activities was reduced by 85% by using the robotic system. Each 7,600 preparations transferred from the manual process to the robotic system results in 1.0 FTE made available for different pharmacy activities.



CONCLUSION

The results of this study revealed that the automated process with the robotic system improves the working efficiency of PT, thereby allowing the reallocation of human resources and the optimization of workload distribution in the daily pharmacy practice. Other indirect advantages related to cost and production quality are achieved.

