

Implementation of a robot into the existing workflow of the cytostatic drugs department in a hospital pharmacy

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Background and importance

The implementation of an automated solution for the production of cytotoxic preparations requires a specific organization of the workflow in the hospital pharmacy to ensure an optimal combination of manual and automated production as well as the effective and efficient use of the technology. Since 2017, the system APOTECaChemo has been installed in the UKSH hospital pharmacy and one of the first goals was to

create an organizational structure that would allow the system to be successfully integrated into the existing workflow of the cytostatic drugs department.

Aim and objectives

Definition of an organizational structure for the best implementation of APOTECaChemo technology into the workflow of the UKSH hospital pharmacy



Fig. 1:
APOTECaChemo
in UKSH Kiel
“A in B”; The robot is in the cleanroom at the Kiel Campus.

Active substances	Categories I = fastest compounding time V = slowest compounding time	Powder or solution Solution: 0 Powder: 3	Number of vials per preparation 1 vial: 1 2 vials: 2 >2 vials: 3	Volume per preparation <50ml: 1 50 - 100 ml: 2 >100ml: 3	Robot speed normal: 1 slow: 2	Points
5-FU medac	I	0	1	1	1	3,00
Ara-cell	I	0	1	1	1	3,00
Avastin	II	0	2	1	1	4,00
Carbomedac	I	0	1	1	1	3,00
Cisplatin Teva	III	0	2	2	1	5,00
Doxo-cell	II	0	2	1	1	4,00
Endoxan	IV	3	1	1	1	6,00
Epirubicin-Actavis	III	0	1	2	2	5,00
Erbix	II	0	1	2	1	4,00
Etopophos	IV	3	1	1	1	6,00
Folinsäure-Actavis	III	0	2	2	1	5,00
Ganciclovir Hexal	IV	3	1	1	1	6,00
Gemcitabin Hexal	I	0	1	1	1	3,00
Herceptin	V	3	3	1	1	8,00
Ifo-cell	I	0	1	1	1	3,00
Inflectra	V	3	3	1	1	8,00
Irinotecan - Actavis	I	0	1	1	1	3,00
Keytruda	II	0	2	1	1	4,00
MTX - Gry	IV	0	3	2	1	6,00
Navirel	I	0	1	1	1	3,00
Neoxatan	I	0	1	1	1	3,00
Opdivo	III	0	3	1	1	5,00
Oxaliplatin Kabi	II	0	2	1	1	4,00
Rixathon, Mabthera	III	0	2	2	1	5,00
Taxceus	I	0	1	1	1	3,00
Topotecan	I	0	1	1	1	3,00

Fig. 2: Table of evaluation of active substances based on 4 categories

Results

The use of the analyzed active substances and the data collected during the “robot intensive week” showed the following results:

- 42% of production can be taken over by APOTECaChemo
- 87% of the active substances currently used in the pharmacy can be processed with APOTECaChemo
- Average of 60 preparations per day (with an actual working time of 5h) achieved with an average of 12 preparations per hour

The automated production was organized in 2 shifts, consisting of 1 pharmacist and 1 PTA per shift able to manage the entire steps of the automated compounding, starting from prescription to preparation delivery.

Material and methods

The pharmacy carried out an analysis to identify the active substances that can best be transferred to the automated production. The selection of suitable active substances for this purpose was based on the following 4 criteria:

- Physical form of the active substance (liquid or powder)
- Average number of vials required to compound a preparation of a specific active substance
- Average volumes of active substance needed to compound a preparation
- Robot speed during the compounded phase

Besides, the pharmacy tried to identify the optimal use of personnel and the optimal organization of the daily workflow for automated compounding.

In addition, the preparations were sent to the robot through the interface between CATO (prescription software) and APOTECA.

The effectiveness of these measures and the resulting work organization were evaluated through a “robot intensive week” in April 2018. The aim was to work more intensively with APOTECaChemo by using a good mix of all the analysed active substances related to the needs of the pharmacy.

Conclusions and relevance

The study shows that the planning and organization of the workflow play a central role in the implementation of a robotic solution in a hospital pharmacy. Through the work and analysis carried out, the hospital pharmacy of the UKSH has successfully combined automated and manual production. This represents an optimal starting point for a continuous improvement in the use of this technology. The work with APOTECaChemo has been implemented in the daily production routine.

