an extraction of the software was done to study the forced steps (the steps refused by the software but accepted by the pharmacist because of the correct volume read) over a period of 6 months.

Results The metrological tests enable to qualify the balances. The bias of the weighing scales fluctuates between 0.94% and 4.40%. Over 6 months, 15 227 preparations were realised with a total of 1 89 334 steps including 49 180 weighing steps. Among those, there were 2023 forced steps (4.1%). The most forced cytotoxic molecules were identified. The two most forced stages were the weighing of the syringe with cytotoxic (41%) and of the final pouch (23%). The 50 ml syringe is responsible for 41% of this forced stage and, in 85% of the cases, it is because the volume to collect has a decimal value.

Conclusion Concerning the sensitivity, a method is elaborated to determine the rate of the false negatives with a fake cytotoxic preparations plan and calculated weighing errors. Our method validation plan is complete with the validation of the two components: precision scale and software.

REFERENCES AND/OR ACKNOWLEDGEMENTS

No conflict of interest.

3PC-025 OPTIMISATION OF COMPOUNDING ORGANISATION AFTER IMPLEMENTING A ROBOTIC SYSTEM FOR AUTOMATED PREPARATION OF ONCOLOGIC DRUGS

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Background The aseptic preparation of oncologic drugs is performed in the centralised, 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 preparations run in parallel are operated by two and one pharmacy technicians (PT), respectively. On average, the annual workload amounts to 35 000 preparations, two-thirds of which 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' utilisation.

Material and methods Manual and automated preparation were analysed 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 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 processes.

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 7600 preparation transferred from the manual process to the robotic system results in 1.0 FTE made available for different working activities.

Conclusion 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 optimisation of workload distribution in the daily pharmacy practice. Other indirect advantages related to cost and production quality are achieved.

REFERENCES AND/OR ACKNOWLEDGEMENTS

No conflict of interest.

3PC-026 WHAT IS THE BEST CHEMICAL DECONTAMINATION SOLUTION FOR CONVENTIONAL ANTI-NEOPLASTIC DRUGS IN A HOSPITAL COMPOUNDING UNIT?

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Background Several decontamination methods are currently available to reduce the occupational exposure of hospital facilities to conventional anti-neoplastic drugs. Alcohol-based microbicides are not sufficiently efficient in removing chemical contamination and data are lacking on many marketed biocides. Recent data confirm that using a specific chemical decontamination solution is helpful in removing traces of contaminants.

Purpose To perform a literature review in order to help pharmacists in choosing a chemical decontamination solution to implement in their compounding unit.

Material and methods Articles were searched on Pubmed using the following requests: 'antineoplastic agents AND cleaning' or 'antineoplastic agents AND chemical degradation' or 'antineoplastic agents AND chemical decontamination'.

Criteria used to classify the performance and usability of decontamination solutions were: decontamination efficiency, number and nature of tested contaminants, hazardousness of the decontamination solution, implementation difficulties and respect of the aseptic environment.

Results Two-hundred and seventy-four articles were retrieved following the request application. Two-hundred and fifty-seven articles were discarded for different reasons leading to the analysis of 17 articles. Fifty-nine methods were tested as degradation (n=19) or desorption methods (n=40) with various decontamination efficiencies ranging from ≤10% to 100%.

Applying the selection criteria, three decontamination solutions were chosen: sodium hypochlorite, admixture of 10^{-2} M sodium dodecyl sulfate (SDS) and 70% isopropanol (80/20), marketed two steps towelettes kit (1. Quaternary ammonium solution, 2. Isopropanol). Their inertness to facilities' surfaces is different and sodium hypochlorite solutions oxide metals. Solutions involving tension-active agents such as SDS may form a film on the facilities surface, which may alter the sterility environment.

Conclusion The applied selection criteria led to select only three decontamination solutions. Their application modalities are also to be discussed regarding the biological and chemical facilities' monitoring. As the solutions were assessed with

various methodologies, further studies are necessary to compare them in the same conditions. Because each solution has been tested with different contaminants, new studies are required to confirm their ability to decontaminate other conventional anti-neoplastic drugs.

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No conflict of interest.

3PC-027 PRODUCTIVITY ANALYSIS OF AN AUTOMATED COMPOUNDING SYSTEM FOR INTRAVENOUS CHEMOTHERAPY

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Background The automated preparation of anti-neoplastic drugs presents unquestionable advantages in terms of precision, asepsis, traceability and decreased occupational exposure to hazardous drugs, increasing the safety of patients and manipulators.

However, productivity remains one of the great unknowns of this emerging technology.

Purpose The objective of this work is to analyse the productivity of an automated anti-neoplastic preparation system since its implementation in the hospital.

Material and methods In this descriptive study, we retrospectively evaluated the collected data from 4 April 2016 to 16 August 2018. Analysing the following variables: number of working days, number of preparations, preparations per hour, number of preparations per drug, dose accuracy, percentage of cancellations and their causes, time per cycle, percentage of automatic work time, number of cycles and average time per preparation according to user, number of final preparations and average of vials per preparation.

Results The number of mixtures prepared was 1095, 2901 and 2901 in 2016, 2017 and 2018, which represents an interannual increase of 265% and 160% respectively. The number of active ingredients prepared with the robotic system was 10 in 2016, 15 in 2017 and 18 in 2018, with Paclitaxel the most frequently prepared drug. The percentage of preparations with deviations from the theoretical dose greater than 10% was 1.9% in 2016, 1.2% in 2017 and 1.3% in 2018.

No differences were observed in the average time per preparation between the different users. The shortest average time per preparation was obtained in cycles of eight final preparations (6.8 min) and with one vial or less per mixture (6.2 min). The average duration per cycle was 43.2 min, with 54% of automatic work.

The main cancellation causes were: vials and syringes recognition errors, weighing errors, adapter recognition failures and computer problems.

Conclusion An increase in productivity has been achieved since 2016: we obtained the greatest productivity in cycles with eight final preparations and one vial or less per preparation. The cycle cancellations are the main limitations for the increase of productivity. The automatic preparation time represents an opportunity to improve productivity in the robotic anti-neoplastic preparation.

REFERENCES AND/OR ACKNOWLEDGEMENTS

No conflict of interest.

3PC-028 DOSE-BANDING GEMCITABINE AND STANDARDISATION OF CHEMOTHERAPY PROTOCOLS PRODUCTION

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Background Prescription and production of chemotherapies are generally based on body surface area, as recommended by the literature. However, standardisation of doses of chemotherapy (dose-banding/DB) has shown benefits for patients and better cost management Advantages of DB of chemotherapy are: reduction in variation of doses, medicine waste, patient waiting time and medication errors; increased pharmacy capacity for chemotherapy, manufacturing of complex compounds and participation in clinical trials; and uniform requirements in presentation and doses.

Purpose Determine which of the drugs compounded in our centralised chemotherapy production unit were potential candidates for DB for adults, while guaranteeing patient safety and meeting the needs of physicians, pharmacists and nurses.

Material and methods We extrapolated from our IT system all the adults' chemotherapy protocols containing gemcitabine active substances, in order to analyse the doses most commonly used.

Dose-banding is based on the latest version of the NHS National Dose-banding Table (2016).[1] Sometimes the same protocols are used for different indications and with different doses, therefore we considered them separately. We subdivided the schemes for department, pathology and banded dose.

Results Our centralised chemotherapy production recently started using DB gemcitabine in 19 protocols. The gynaecology department uses 63% of the schemes, for the following indications: ovarian, cervical and endometrial cancer. They foresee the administration of 1000 mg of DB gemcitabine, and uterine leiomyosarcoma (900 mg DB gemcitabine). The medical oncology department uses 37% of the schemes, for indications such as: biliopancreatic cancer (1000 mg DB gemcitabine), metastatic breast cancer (800 mg DB gemcitabine), mesothelioma and non-small-cell lung carcinoma (1250 mg DB gemcitabine). In most of the cases, gemcitabine is administered on the first and eighth day of a 21 day chemotherapeutic cycle and associated with other active substances: bevacizumab, carboplatinum, cisplatinum, dacarbazine, docetaxel and oxaliplatinum.

Conclusion The standardisation of chemotherapeutic doses promotes the rationalisation of pharmacy activity and allows the preparation of batches and acceleration of preparation processes. Efficiency and automation also ensure safety and quality control on chemotherapeutic products. Further studies are needed to investigate product stability and develop an alternative way of planning chemotherapy production.

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No conflict of interest.