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Comparison between two pharmaceutical production processes in a French regional cancer center☆

Impact de deux processus de préparations anticipées et du contrôle analytique sur le temps de dispensation au sein d'un centre de lutte contre le cancer

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Summary

Introduction. In order to reduce outpatient-waiting delays in oncology departments, there has been development of new production processes. This study aimed to determine the impact of three different production organizations (nominative extemporaneous preparations, anticipated preparations, and non-nominative dose-banded preparations), with or without analytical control, on outpatient chemotherapy production times, in a French regional cancer center.

Materials and methods. For the three organizations, we measured the global and detailed production times of the preparations, during three distinct periods, and compared them.

Results. With an analytical control, anticipated nominative preparations and non-nominative dose-banded preparations reduced waiting delays by 29 and 19 minutes, respectively, compared to extemporaneous nominative preparations, and by 12 and 9 minutes, respectively, without analytical control.

Discussion. Anticipated nominative preparations and non-nominative dose standardized preparations allow reducing time dispensation, even with analytical control.

Conclusion. Implementing these new production processes could reduce outpatient-waiting delays in oncology departments.

Résumé

Introduction. Afin de réduire le temps d'attente des patients des hôpitaux de jour en oncologie, de nouveaux processus de préparation ont été développés. Cette étude compare les temps de dispensation de trois circuits de production (préparations magistrales du jour-même, préparations magistrales anticipées ou préparations hospitalières à doses standardisées), avec ou sans contrôle analytique, au sein d'un centre de lutte contre le cancer.

Matériel et méthodes. Au cours de trois périodes distinctes, les temps totaux de dispensation et les temps des étapes intermédiaires ont été mesurés, puis comparés entre eux.

Résultats. Les préparations magistrales anticipées et hospitalières à doses standardisées permettent des gains de temps respectifs de 29 et 19 minutes avec un contrôle analytique, et de 12 et 9 minutes sans contrôle analytique, sur les préparations magistrales du jour-même.

Discussion. Les préparations magistrales et les préparations hospitalières à doses standardisées réduisent le temps de dispensation, y compris en cas de contrôle analytique.

Conclusion. Ces nouveaux procédés de fabrication et de gestion de la production peuvent participer à la diminution du temps d'attente des patients en hôpital de jour.

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Introduction

The increase in the incidence of cancer in France (365,500 new cases in France in 2011 [1]) has raised particular concern. This causes increase in the demand of medical care accordingly, saturating healthcare establishments, and, as a result, lengthening the start-up time to initiate therapy. It is thus essential to be able to decrease the time of dispensation of the antineoplastic treatments and to improve the efficiency of the organization of oncology departments. In 2012, our cancer center produced approximately 22,000 preparations of antineoplastic agent within its centralized unit of pharmacotechnical preparation (Oncologic Clinical Pharmacy Unit), among which practically 17,000 were for the outpatients, which account for approximately 10,000 hospitalizations a year.

Production of these preparations was, until October 2012, realised in a nominative extemporaneous manner, at the time of the reception of the prescription. This lack of production fluidity means that there are no anticipations in spite of the knowledge of the patient's reception schedule. We then intended to produce in an anticipated way certain compounded drugs. The method of dose standardisation ("dose banding") has been described in the English literature, since the beginning of 2000, through publications and with tools for the implementation [2,3]. This method allows the early-anticipated production of preparations in standardized doses. This methodology has also been developed in other European countries, such as Belgium [4], as well as in certain French hospitals; the latter apply this anticipated standardized method of production, in parallel to a non standardized production anticipated the day before the dispensation [5,6]. It seemed interesting to implement these production circuits in a regional cancer center.

We developed two new circuits of preparation, in parallel to the usual production circuit (magistral preparations produced the same day): one for the anticipated, nominative specific preparations for a given patient, prepared the day before and the other one, concerning non-nominative specific preparations, in standardized doses, prepared by batches, several days in advance. With respect to the French regulations [7,8], and being inspired by other concerned French hospitals, it was decided to consider the nominative specific preparations, the production of which is anticipated the day before, as magistral preparations, and non-nominative specific preparations for standardized doses, the production of which is several days in advance, as hospital preparations. The stability of the preparations were determined according to Stabilis® data [9].

Our center uses an electronic medical record and a chemotherapy prescription software (Chimio®, Computer Engineering), allowing the pharmaceutical validation and the editing of manufacturing batch document. During our study, the pharmacotechnical preparation unit worked with three compounding aseptic isolator, two of them for the storage and decontamination of a great volume of material during a cycle of three hours, plus one isolator of preparation provided with four workstations. This way of functioning allows the materials necessary for the realization of the preparations to be immediately available for production. Once the preparations completed, a visual control, medicinal conciliation between the labelled preparations, the manufacturing form, and the prescription, as well as an analytical control was carried out. The latter was realised by sampling approximately one milliliter of every preparation and analysing it by UV-Raman spectroscopy. The characteristics of the signal collected was compared to signals present in a database of molecules to allow a qualitative identification and a quantitative dosage. The released preparations then wait for the logistic staff to forward it to the hospital departments. A departure takes place as often as possible, approximately every 10 minutes.

Three circuits follow the procedure described above, but there may be exclusion of certain activities or parts of activity according to the type of preparation.

For a magistral extemporaneous nominative preparation (MEP), the prescription is automatically edited after medical validation and then it is pharmaceutically checked. The manufacturing form is then edited by the pharmacist, and the preparation realised, and then inspected outside of the isolator with a final conciliation made between the prescription and the production form. The preparation is then analytically controlled and released and transported to the oncology departments.

The magistral anticipated nominative preparations (MAP) are ready to be dispatched when the medical order is validated and edited, because the manufacturing and the control process (visual, analytical, and conciliation) were already realized. The pharmaceutical validation was realised before the physician's validation to allow the anticipated editing of the manufacturing form without medical validation. The anticipated validation was realised using the outpatient's computerized consultations planning system, which allows the selection of patients whose chemotherapy protocols allow the preparations to be anticipated. The protocole can only be anticipated if the doctor has already included the patient into a protocole defined on the Chimio® software and if the prescription is already in the "scheduled" or "prescribed"