Advanced preparation of chemotherapy – consequences

Rolf Johansen[1], Wendy Klem[1], Allan Kah Astrup[1], Bich Thuy Truong[2]
[1]Hospital pharmacies enterprise, South Eastern Norway , [2]School of Pharmacy, University of Oslo

Contact: rolf.johansen@sykehusapotekene.no

Background

Delivering chemotherapy efficiently and economically to the right patient at the right time is becoming more difficult. This is a challenge for both the hospital ward and pharmacy. A way to increase capacity using the same facilities and the same number of personnel must be developed. Traditionally chemotherapy doses are prepared after the patient's blood tests have been confirmed by the doctor. The orders come in at a rush causing an enormous work load for the pharmacy resulting in long delays for the wards and for the treatment of the patient.

The Hospital pharmacy Lillehammer (since May 2011) has made up all the doses with the ingredients costing less than NOK 1000 (125 euro) before the blood test results are confirmed. This advanced production of cheap drugs provides an efficient work flow in the hospital pharmacy resulting in less waiting time for hospital departments.
In this way the pharmacy has a continuous work with cheap drugs, in addition expensive drugs can be prepared immediately when confirmed by the ward.

Some of the pre-prepared doses were not used – the cost of waste was covered by the hospital pharmacy. If the dose was reduced however the ward adjusted this by giving only a part of the volume. The label always contained the exact volume in the infusion bag. The new volume was calculated using the following formula:
New volume = original volume x new dose / original dose

Purpose

To determine the consequences of advanced production.

Materials and methods

The cytotoxic preparations were divided into cheap and expensive drugs. Production journal statistics were used to determine how many doses were changed or not used and wastage was calculated. Production time studies were carried out before and after the introduction of advanced production. In addition to statistics from the Hospital pharmacy Lillehammer we obtained data from the Hospital pharmacy Hamar regarding drug expenses and number of cancelled doses.

Results

The average production time for reconstitution per dose is 5-10 mins. Total production time has been reduced from 11 mins. to 6 mins. Unfortunately advanced production produces some drug waste. The cost of drug waste has been measured to be less than 1% of total drug cost.

Conclusion

Advanced preparation of cytotoxics resulted in reduced preparation time in the pharmacy, and less waiting time on the wards. The cost of waste (both labour and drug costs) were minimal compared to the advantages for both the pharmacy and wards. We achieved more efficient and less stressful work both in the pharmacy and at the ward, and the patients benefitted by avoiding extra waiting time.

Expensive drugs

Chemotherapy uses expensive drugs eg bevacizumab, pemetrexed, bendamustin, bortezomib, trastuzumab and rituximab.

Cheap drugs

Many widely used cytotoxic drugs are cheap, i.e. 5-FU, paclitaxel, docetaxel, cyclophosphamide, doxorubicin, epirubicin, oxilaplatin, irinotecan, vincristin, vinorelbin, carboplatin, cisplatin and gemcitabin.

Cancelled doses.

All data is based on 2 months (march and may) in 2013

	Pharmacy I (Lillehammer)		Pharmacy II (Hamar)	
	Number/Cost	Share (%)	Number/Cost	Share (%)
Number of doses in total (2 months)	677	100 %	1052	100 %
Hereby number of expensive doses	190	28,10 %	174	16,50 %
Hereby number of cheap doses	487	71,90 %	878	83,50 %
Number of cancelled cheap doses	26	3,90 %	160	15,20 %
Cost – all doses	NOK 1.572.750,-	100 %	NOK 2.783.750,-	100 %
Cost – cancelled cheap doses	NOK 2.331,-	0,19 %	NOK 21.800,-	0,78 %

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