

# EVALUATION OF A CLINICAL DECISION SUPPORT SYSTEM (CDSS) TO OPTIMIZE CYTOTOXIC DRUG DOSING AND CONTINUOUS SURVEILLANCE IN OUTPATIENT CANCER PATIENTS WITH RENAL IMPAIRMENT

Michiel A. Damhof, Hospitalgroup Twente (ZGT), Almelo, The Netherlands.

## Background

The incidence of renal impairment is increasing in cancer patients, since patients are getting older and more aggressive treatments become available for this population. For those drugs in which renal excretion is an important determinant in elimination, dose adjustment is often required if renal function is impaired.

"CS rules" is a cognitive clinical decision support system (CDSS) designed to assist clinical pharmacists in making dosing adjustments for individual patients.

## Objective

To prevent cytotoxic toxicity in outpatient cancer patients with renal impairment.

## Methods

From November 2015 until May 2016 a pilot was performed with the CDSS to optimize chemotherapy in patients with renal failure in the outpatient setting. Clinical rules were defined for 11 cytotoxic drugs used in the outpatient setting, for which dose reduction is required if renal function is impaired. The recommendations on chemotherapeutic dosing in patients with renal failure were consistent with the established guidelines and published evidence.

The CDSS was run overnight and alerts were generated on all active electronic medication orders with chemotherapeutics using the most recent creatinine value. Rules were generated during the whole period that a chemotherapeutic agent was used, independently of doctor or pharmacy visits. Alerts were analysed by the pharmacist in the outpatient pharmacy of the hospital. If a dose reduction seemed necessary, the oncologist was contacted by the pharmacist and the necessity of a dose reduction or modification was discussed.

## Results

During the pilot period, the investigated chemotherapeutics were prescribed to 232 cancer patients. The 11 clinical rules generated alerts for 33 patients with impaired renal function. Overall, these alerts resulted in 9.1 % of the patients in an intervention by the clinical pharmacist about dose reduction due to impaired renal function.

Cytotoxic drugs	Number of Patients	Number of patients with impaired renal function detected by CDSS		Number of interventions by the pharmacist	
		n	% <sup>a</sup>	n	% <sup>b</sup>
Capecitabine	118	6	5.1	2	33.3
Crizotinib	2	0	0	0	0
Cyclophosphamide	23	4	17.4	0	0
Etoposide	2	0	0	0	0
Fludarabine	4	3	75	0	0
Hydroxycarbamide	70	18	25.7	1	5.6
Lomustine	2	1	50	0	0
Melphalan	10	1	10	0	0
Mercaptopurine	0	0	0	0	0
Procarbazine	0	0	0	0	0
Topotecan	1	0	0	0	0
<b>Total</b>	<b>232</b>	<b>33</b>	<b>14.2</b>	<b>3</b>	<b>9.1</b>

**Table 1: Overview of patients and interventions performed by the pharmacist.**

**a:** as a percentage of number of patients, **b:** as a percentage of patients with renal impairment.

## Discussion and conclusions

The identification of patients at risk helps the pharmacist and oncologist to optimize drug therapy in cancer patients with renal dysfunction in the outpatient setting. The "impaired renal function" alerts resulted in valuable interventions by the pharmacist. In conclusion, this study shows that a CDSS can effectively be used in an outpatient pharmacy practice to select patients at risk of cytotoxic drug overdose due to renal impairment with a continuous surveillance independently of new drug dispensing in the pharmacy or a doctor's visit.

Email: [m.damhof@zgt.nl](mailto:m.damhof@zgt.nl)

