A comparison of drug-related problems before and after the introduction of a clinical decision support system during medication review

Sanne Verdoorn1,2, Henk-Frans Kwint2, Marcel Bouvy1,2, Jacobijn Gussekloo3, Petra Hoogland4  
1 Division of Pharmacoepidemiology and Clinical Pharmacology, Utrecht Institute for Pharmaceutical Sciences (UIPS), Utrecht University, Utrecht, the Netherlands  
2 SIR Institute for Pharmacy Practice and Policy; Leiden, the Netherlands; 3 Department Public Health and Primary Care, Leiden University Medical Center (LUMC), Leiden, the Netherlands  
4 Nederlandse Service Apotheek Beheer BV, Enter, the Netherlands

Background and objective
Explicit criteria, like the Beers-criteria or STOPP/START criteria are developed to identify inappropriate medication and prescribing omissions. Explicit criteria can be easily integrated in a clinical decision support system (CDSS). The aim of this study was to investigate the effect of adding a CDSS to medication review software in daily pharmacy practice.

Setting and method
A pre-post analysis of data from the medication review tool of pharmacists who performed at least 5 medication reviews in patients aged ≥65 years using ≥5 medicines. In 2013, a CDSS was added to the medication review tool, which could detect potential DRPs at the start of the medication review. Per pharmacy, the number and type of DRPs and implementation rate were calculated.

Results
The mean number of DRPs per patient was higher in the post-CDSS cohort than in the pre-CDSS cohort (3.6 vs. 3.2; p < 0.01). The mean implementation rate was lower post-CDSS (44% vs. 50%; p < 0.01), which resulted in an equal number of resolved DRPs per patient in both cohorts (mean 1.6) (Figure 1). 41% of the DRPs in the post-CDSS cohort were identified by the CDSS. The implementation rate of the DRPs generated by the CDSS was lower than the implementation rate of DRPs found by the pharmacists themselves in the post-CDSS cohort (29% vs. 55%; p < 0.01). Differences in type of DRPs and interventions between both cohorts are shown in figure 2 and figure 3.

Conclusions
The use of a CDSS during medication review is associated with the identification of a higher number of DRPs, but similarly the introduction of CDSS led to a lower implementation rate. Further development of medication review software with more specific alerts is needed for the identification of more clinically relevant DRPs.

Figure 1
Differences in number of identified and solved DRPs pre and post CDSS

N = 121 pharmacies. Numbers are based on aggregates per pharmacy

CDSS = clinical decision support system

* = p-value < 0.05

Top 10 Prevalent clinical rules incorporated into the CDSS
1. Cardiovascular disease without a statin
2. Concomitant use of three or more antihypertensives
3. Absence of antiplatelet therapy in cardiovascular disease
4. Inconvenience of use of ACE-inhibitor: once-daily alternative or combination available
5. Inappropriate use of inhaled corticosteroids in COPD
6. Concomitant use of two or more antithrombics
7. Use of aerosol without a (new) spacer
8. Loop-diuretics as first-line treatment of hypertension
9. Lack of vitamin D in osteoporosis
10. Heart failure without an ACE-inhibitor