



# APRIORI

## - a model for integrated drug interaction control in community pharmacies in Norway

Tore Reinholdt, M.Sci. Pharm., Norwegian Pharmacy Association

[www.apotek.no](http://www.apotek.no) / [apotekforeningen@apotek.no](mailto:apotekforeningen@apotek.no)

The Norwegian pharmacies former drug interaction database (DRUID ) signaled warnings in the range from theoretically possible interactions to interactions that could result in severe patient harm. The database gave too many irrelevant warnings, therefore being an improper tool in everyday practice. On request from The Norwegian Pharmacy Association a new interaction database, APRIORI, was developed for pharmacies. APRIORI was integrated in the Norwegian community pharmacy data system FarmaPro in February 2009.

### Pharmacist perspective

APRIORI is developed and designed to meet the specific needs of Norwegian community pharmacists when filling prescriptions. In developing the database it has been a goal to select highly clinically relevant interactions. The pharmacist should always take actions against such interactions. The interaction solving process includes interviewing the patient and most often contacting the prescriber.

The database contains about 550 drug interactions of which 80 % are pharmacokinetic interactions and 20 % pharmacodynamic interactions. In selecting the interactions to the database there has been a specific focus on pharmacokinetic interactions since those interactions are not obvious from a therapeutic viewpoint, and therefore can be difficult to detect.

Drug interactions which are seen as well known, as for example the pharmacodynamic interaction sildenafil – glyceryl trinitrate, are not included in APRIORI. Such interactions are to be handled without any computer system support, emphasizing the continued need of the pharmacist's skills in pharmacodynamics and –kineics.

### National quality standard

The new drug interaction database, APRIORI is now in use by all pharmacies and in all pharmacy chains in Norway.

APRIORI represents the national quality standard for drug interaction handling in Norwegian community pharmacies.

### Unique dataset

APRIORI searches for interactions among today's prescriptions as well as in historical files in the local pharmacy data system. When APRIORI detects a drug interaction, a warning is shown on the data screen. To help the pharmacist in dealing with the interaction problem APRIORI presents a dataset, unique for the interaction:

- Drug interaction mechanism
- Clinical consequence
- Alternative drugs to be used
- Dose adjustment recommendations
- Evidence base

References are also listed with links to the articles on the internet. This dataset makes a solid knowledgebase for making judgments on how to deal with the interaction problem.

### CONCLUSION

APRIORI consists of drug interactions that always need pharmacist action. APRIORI is harmonized with the Norwegian drug interaction database DRUID, which is the mostly used database among prescribers. Contrary to DRUID, APRIORI presents evidence based action oriented advices. This makes APRIORI a unique tool for pharmacists in everyday practice. APRIORI represents a solid knowledgebase for pharmacists when discussing drug interaction problems with prescribers.

**Drug interaction warning:**  
N05A X08 (Risperidone tablets 3mg)  
N06A B03 (Fluoxetine capsules 20mg)

Drug interaction mechanism	Dose adjustment recommendations
Fluoxetine inhibits risperidone metabolism via CYP2D6.	The risperidone dose should be approximately halved in combination with fluoxetine. The grade of interaction will vary from patient to patient, and the risperidone dose should be adjusted according to clinical response and adverse effects. Serum concentration monitoring could be a tool to assure correct dosing.

Clinical consequence	Evidence base
Increased serum concentration of risperidone and its active metabolite and the sum of risperidone and active metabolite (respectively 3-4 and 1,3-1,8 times – interaction studies), increased risk of adverse effects	Drug interaction studies and case reports.

Alternative drugs to be used	References:
Sertraline does not inhibit CYP2D6 to a relevant degree. Citalopram og escitalopram are moderate CYP2D6 inhibitors, but the interaction potential with risperidone is assumed to be low.	1 Bondolfi G, et al. The effect of fluoxetine on... 2 Bonikar V, et al. Urinary retention caused after... 3 Dubbelman YD, et al. [Severe tardive dyskinesia... 4 Benazzi F. Gynecomastia with risperidone-fluoxetine... 5 de Leon J, et al. The CYP2D6 poor metabolizer...