INTRODUCTION
The pharmaceutical industry supplies oral solid dosage forms which are generally inadequate for pediatric needs. This obliges pharmacies, in hospitals that have a pediatric unit, to prepare capsules having doses that correspond to age and weight of the children. Thus a multitude of doses are necessary, which leads to individualized preparations. These solid forms are not only time consuming to make but also sub-optimal in their utilization. In effect, capsules for pediatric use have many disadvantages:

a) There is a risk of confusion which is not negligible
b) The bioavailability can vary with the granulometry of the powders used
c) These capsules in fact only represent a form of transport because they have to be opened when they are administered to small children.

OBJECTIVES
The two university hospitals of French speaking Switzerland receive the majority of acute pediatric patients. For this reason they have very similar needs in drug doses. Consequently they decided to collaborate with the following objectives:

a) Replacement of the capsules by oral liquid preparations supplying various doses.
b) Development of new formulations and stability tests.
c) Supplying a data base of formulas, excipients, stability, packaging and administration.

MATERIALS AND METHODS
An inventory of capsules manufactured in the two hospitals in 1998 was realized.

The HUG are now testing the following Rosemont products for patient compliance, with the eventual possibility of purchasing for the two hospitals:
FUROSEMIDE, PROPRANOLOL, SPIRONOLACTONE.
As this poster was being written a liquid form of URSODEOXYCHOLIC ACID arrived on the market in Switzerland.

REPLACEMENT OF SOLID DOSES BY ORAL LIQUID PREPARATIONS FOR PEDIATRICS:
A COLLABORATIVE APPROACH BETWEEN 2 SWISS UNIVERSITY HOSPITAL CENTRES
Griffiths W.1, Gloor S.2, Berger L. 2, Sigrist T.1, Podilsky G.1, Dommeeyer A.1; Pannatier A.2
1 Pharmacie des Hôpitaux Universitaires de Genève (HUG); 2 Pharmacie du Centre Hospitalier Universitaire Vaudois (CHUV)

OTHER PHARMACEUTICAL TEXTS
- Other companies, such as Rosemont (UK), manufacture drugs which are out of patent. Some are supplied under Rosemont brand names, others have a «specials» licence with a short expiry date (6 to 12 months).
- A formula for ranitidine is also in development in the CHUV. In the meantime, Zantic has been imported from the UK with a special licence.
- The following products are, at this moment, in the stage of development: at the CHUV, captopril and at the HUG, enalapril and phenobarbitone. For the last product, liquid forms are available on the market but the compliance for children is very poor.
- For all these products, data will be published later.

ADMINISTRATION SYSTEMS
Tests were carried out on branded products supplied in dropper bottles after complaints from the pediatric wards. Up to 60 % error was found, depending on the position of the bottle, whether it was full or not, the density of the liquid and the prevailing temperature.

The administration system BAXA (see website) was chosen for the patient compliance tests. BAXA has a full range of oral syringes (0.5 ml to 60 ml) and a panoply of accessories such as syringe stoppers and adapters for naso-gastric feeding lines.

The important advantages of this system are that the syringes do not accept needles (no risks of injection), and a better measuring accuracy is obtained.

DEVELOPMENT AND RESULTS
FORMULATION AND ANALYTICAL DATA
In 1998 the CHUV developed a hydrochlorothiazide suspension (see formula below) which will be shortly introduced in the HUG. The formula, manufacturing method, analytical conditions and stability data are shown below.

The first results of our experience should incite every pharmacy, reduction of stock wastage and less production time. For the hydrochlorothiazide, the manufacturing time saving is estimated to 8.5 hours (3'000 capsules).

DISCUSSION
In practice, from the first results of the introduction of oral liquid solutions and of the new system of administration, the following advantages appear:

a) Possibility to dispense different dosages from a single preparation.
b) Reducing the time lag between the medical order and administration to the patient.
c) Cost saving by non-call interventions by the pharmacy, reduction of stock wastage and less production time. For the hydrochlorothiazide, the manufacturing time saving is estimated to 8.5 hours (3'000 capsules).
d) Better administration accuracy.

CONCLUSION
The use of liquid forms in pediatric wards facilitates the drug administration and improves the patients’ security.

Inter-hospital collaboration increases efficacy by sharing out the development of new forms.

The first results of our experience should incite every pharmacy working for pediatric units to replace capsules by liquid preparations.

BIBLIOGRAPHY