

# Does the Computerised Physician Order Entry system reduce prescribing errors for inpatients ?

## A before-after study



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Keywords : medication errors, risk management, pharmaceutical intervention, electronic prescribing

### BACKGROUND

The Health institution recommends the use of Health Information Technology to reduce the risk of iatrogenic errors. While many publications highlight the benefits of Computerised Physician Order Entry (CPOE) system, others worry about the unintended consequences of such a system on the health care quality.

D. W. Bates and al., - The Impact of Computerized Physician Order Entry on Medication Error Prevention -, J. Am. Med. Inform. Assoc., July 1999.  
R. Shulman and al., - Medication errors: a prospective cohort study of hand-written and computerized physician order entry in the intensive care unit -, Crit. Care, 2005.  
J. S. Ashand al., - Categorizing the unintended sociotechnical consequences of computerized provider order entry -, Int. J. Med. Inf., June 2007.

### OBJECTIVE

To measure the computerisation impact on the quality of drug prescriptions.

### METHODS

Observational study conducted before and after the CPOE system implementation

		CPOE implementation	
		BEFORE	AFTER
Study periods		30 days in 2014	30 days in 2015
Inclusion of patients		In 2 medical units (cardiology and diabetology) ≈ 41 beds	
		All admitted patients	All admitted patients
STUDY	Collection	<b>Handwritten prescriptions</b> → Pharmaceutical Interventions: Number and types*	<b>Computerised prescriptions</b> → Pharmaceutical Interventions: Number and types*
	Analysis	• <b>Quantitative analysis</b> : ratios PI per patient = $\frac{\text{(number of PI)}}{\text{(number of patients)}}$ (with and without c-PI) • <b>Qualitative analysis</b> : types* of PI/error	
		Before- after COMPARISON (Chi <sup>2</sup> , Fisher)	

**PI = s-PI + c-PI**

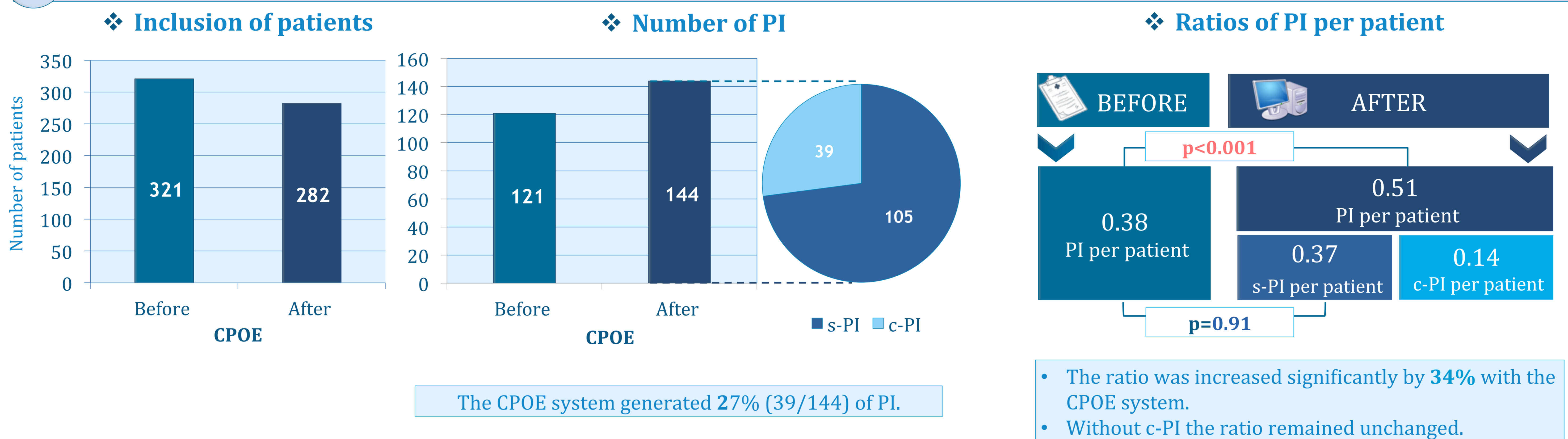
- PI = Pharmaceutical Intervention :  
→ Prescribing error identified and notified by pharmacists
- s-PI = Standard PI
- c-PI = PI related to the computerisation (CPOE)

\* According to the categorisation of the SFPC (Société Française de Pharmacie Clinique : French Society of Clinical Pharmacy)

### RESULTS

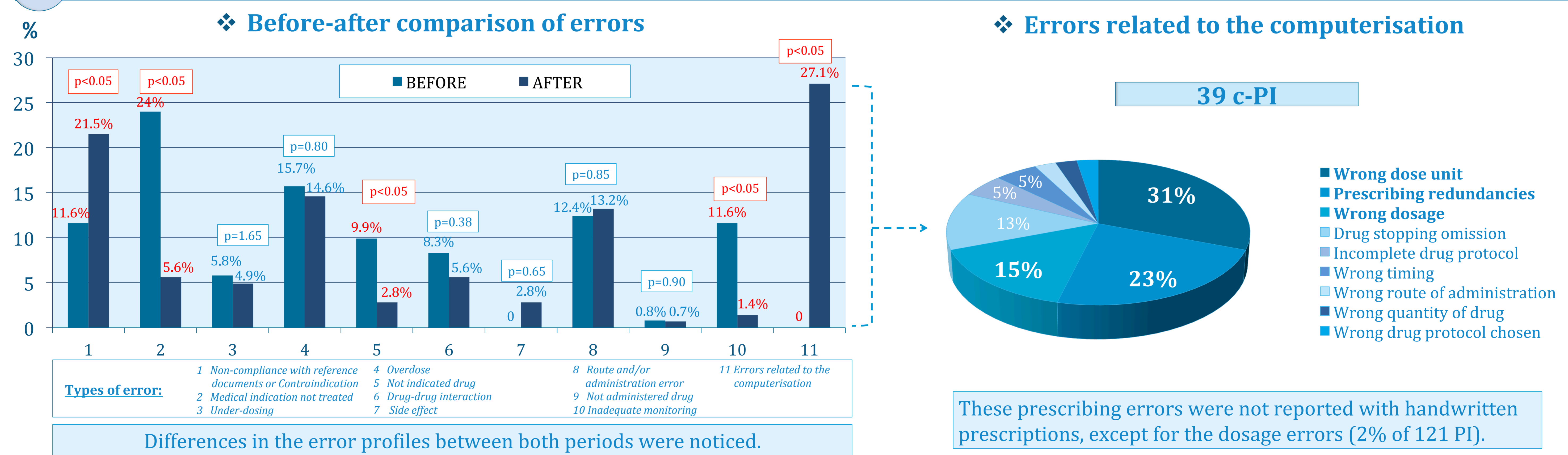
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#### How many PI?



2

#### Which types of error?



### DISCUSSION-CONCLUSION

With the use of the CPOE system, the iatrogenic risk seems to increase. A new kind of errors has been observed: the errors related to the CPOE system. These errors can be due to a lack of software ergonomics (poor readability of the prescriptions, complex functionality) or a misuse of it by the physicians. However, they are avoidable. In order to reduce them, it is important to raise the level of awareness of the prescribers, to improve their training and to promote the vigilance of the pharmacists and the nurses. A partnership with the software publisher is essential to secure the CPOE system and make it evolve.

Acknowledgements: We thank the pharmacists of Rangueil Hospital, physicians and nurses of the diabetology and cardiology departments.

# Apps for paediatric dosing – an evaluation

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## Objectives

Thousands of medical apps can be found in the apple app store and google play. This huge amount makes it difficult to find an appropriate app and to ensure quality and accuracy of an app.

Since we are interested to see whether the available apps are safe to use and to identify areas for possible improvement, we evaluated their quality and content. This evaluation was done in accordance with the European Statements of Hospital Pharmacy to be involved in eHealth/mHealth procedures and to decrease the risk of medication errors (statements 1.7, 5.5).<sup>1</sup>

Our website [www.kinderdosierungen.ch](http://www.kinderdosierungen.ch) provides paediatric dosages in two languages, German and French (the English version will be published soon). To increase usability, we aim to develop a mobile version whereby the results of our evaluation might be useful.

## Methods

### Search for paediatric dosing apps

- Keywords such as paediatric, medical, app, dosing (in English or German)
- Perform a google search and search the apple app store and google play
- Search between April and June 2015

### Inclusion criteria

- Part I: Selection of apps in either English or German containing structured paediatric dosages (preselection)
- Part II: Selection of apps with a dosage calculator and either more than 70 active ingredients or a calculator specific for preterm infants (in-depth evaluation)

## Conclusion

- Several high quality paediatric dosage apps are available.
- The apps Epocrates, Lexicomp and Safe Dose reached the highest scores in our evaluation, followed by AGN Emergency Booklet and EMRA Peds Meds.
- The calculator is the feature that could be improved in all five top apps.
- It is important to keep in mind that the appropriate medical app depends on the contents and features that are relevant for the individual user.
- We recommend that prior to using an app, a short evaluation is performed.

## Evaluation

- Six main categories containing a total of 73 criteria were chosen (Table 1)
- Category weights chosen according to importance for usage by healthcare professionals (Table 1)
- Criteria and weights defined by two experts

Table 1: In-depth evaluation of selected paediatric dosage apps

Category (weight)	Criteria (examples out of 73 criteria)
Quality/Content (35%)	Updates, maximum dose, different dosages for different indications, accuracy of dosage, references
Quantity (10%)	Number of active ingredients and preparations, different routes of administration
Calculator (20%)	Integration, plausibility check weight/age, pre-term calculations
Features (15%)	Add bookmarks, calculation of volumes (liquid forms) or tablets (solid forms), different therapeutic categories
Usability (15%)	Data presentation, efficiency
Additional professional information (5%)	Adverse events, drug-drug interactions, compatibility

## Results & Discussion



Figure 1: Paediatric dosing app selected for in-depth evaluation<sup>2</sup>

- Preselection: 43 paediatric dosage apps
- Eighteen apps fulfilled criteria for in-depth evaluation
- Top five apps: Epocrates, Lexicomp, Safe Dose, AGN Emergency Booklet, EMRA Peds Meds
- Table 2: Ranking of top five apps within the 18 included apps for each of the six categories
- Table 3: Summary of different details together with strengths and weaknesses of the top five apps

### Suggestions for improvements

- Calculators, especially regarding integration of preterm infant calculations
- Data presentation: Large amount of information to be presented

### Important to know

- No danger to use any of the 18 evaluated apps
- Quality of the dosages of seven randomly chosen active ingredients from different drug groups (e.g. amoxicillin, furosemide, paracetamol) were evaluated and displayed correct dosage ranges

### Limitation of the evaluation

- Evaluation is based on criteria/weights that two experts defined
- End result could be different depending on criteria/weights chosen

Table 2: Ranking within categories for the top five paediatric dosing apps

App	Quality/Content	Quantity	Calculator	Features	Usability	Additional professional information	Rank
Epocrates	3	3	15	3	3	3	1
Lexicomp	1	1	18	2	17	1	1
Safe Dose	2	5	9	1	5	2	1
AGN Emergency Booklet	6	6	8	4	7	13	4
EMRA Peds Meds	10	7	1	5	7	13	5

Table 3: Details of the top five paediatric dosing apps

	Languages	Operation system	Price (CHF)	Calculator	Strengths	Weaknesses
Epocrates	English	Android iOS	free	integrated manual calculation	differentiation* usability	calculator
Lexicomp	English German further languages	Android iOS	75	not integrated	quality quantity	calculator
Safe Dose	English German further languages	Android iOS	free (limited number of medications) 100 (all medications)	integrated automatic calculation	features usability	missing galenic forms
AGN Emergency Booklet	German	Android	24	integrated automatic calculation hard to find	administrative features (FAQ, informations)	additional professional information
EMRA Peds Meds	English	iOS	3	integrated automatic calculation	calculator	additional professional information differentiation*

\*Differentiation: several indications, different dosages for different age groups

# IMPROVING PHARMACOLOGICAL TREATMENT: REAL-TIME SAFETY AUDITS

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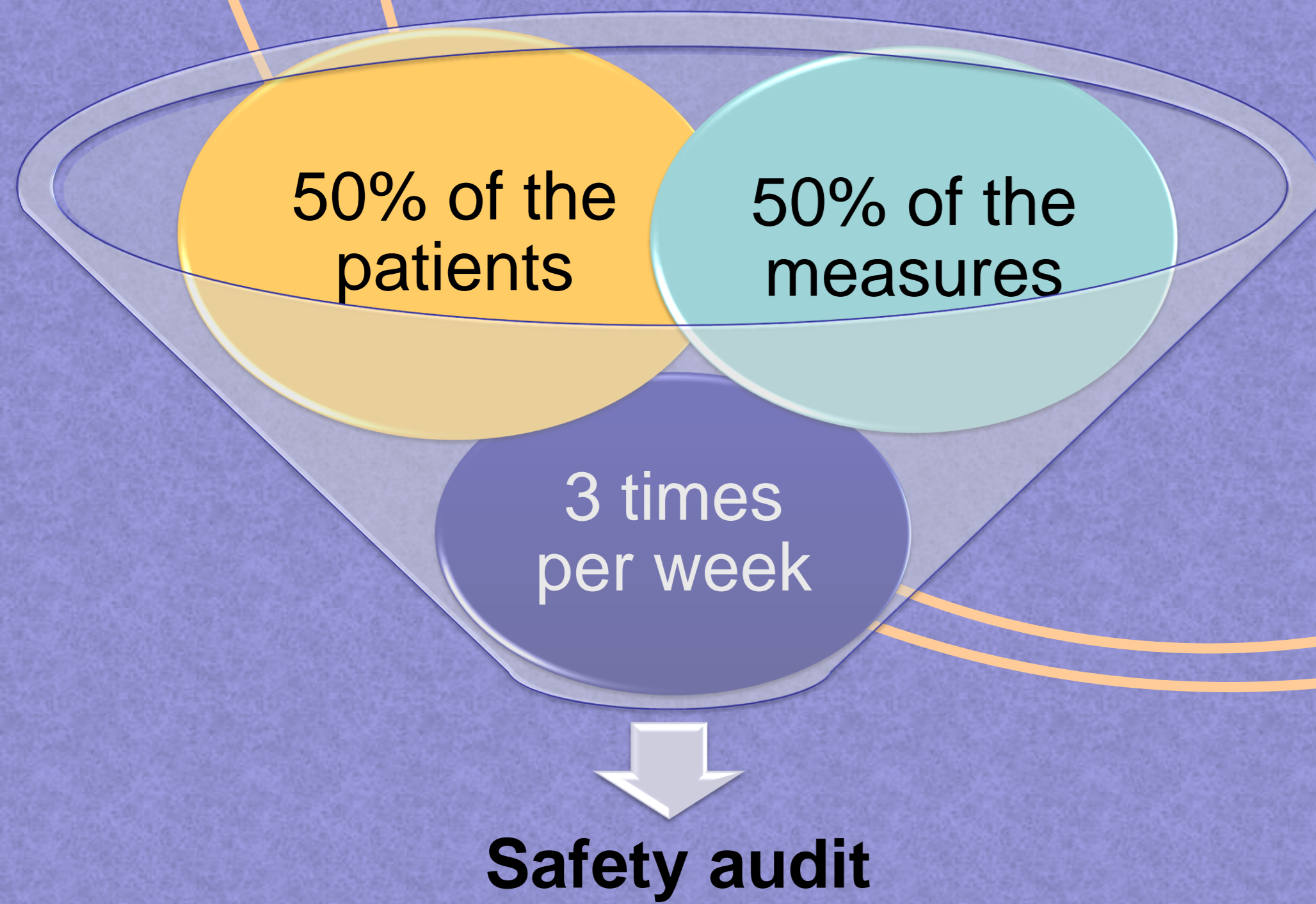
## Objectives

Patients admitted to intensive care units (ICU) are characterized by their need for a more advanced level of care and a higher risk of patient safety-related incidents. Errors in pharmacological treatments may occur due to an unintended act or by omission.

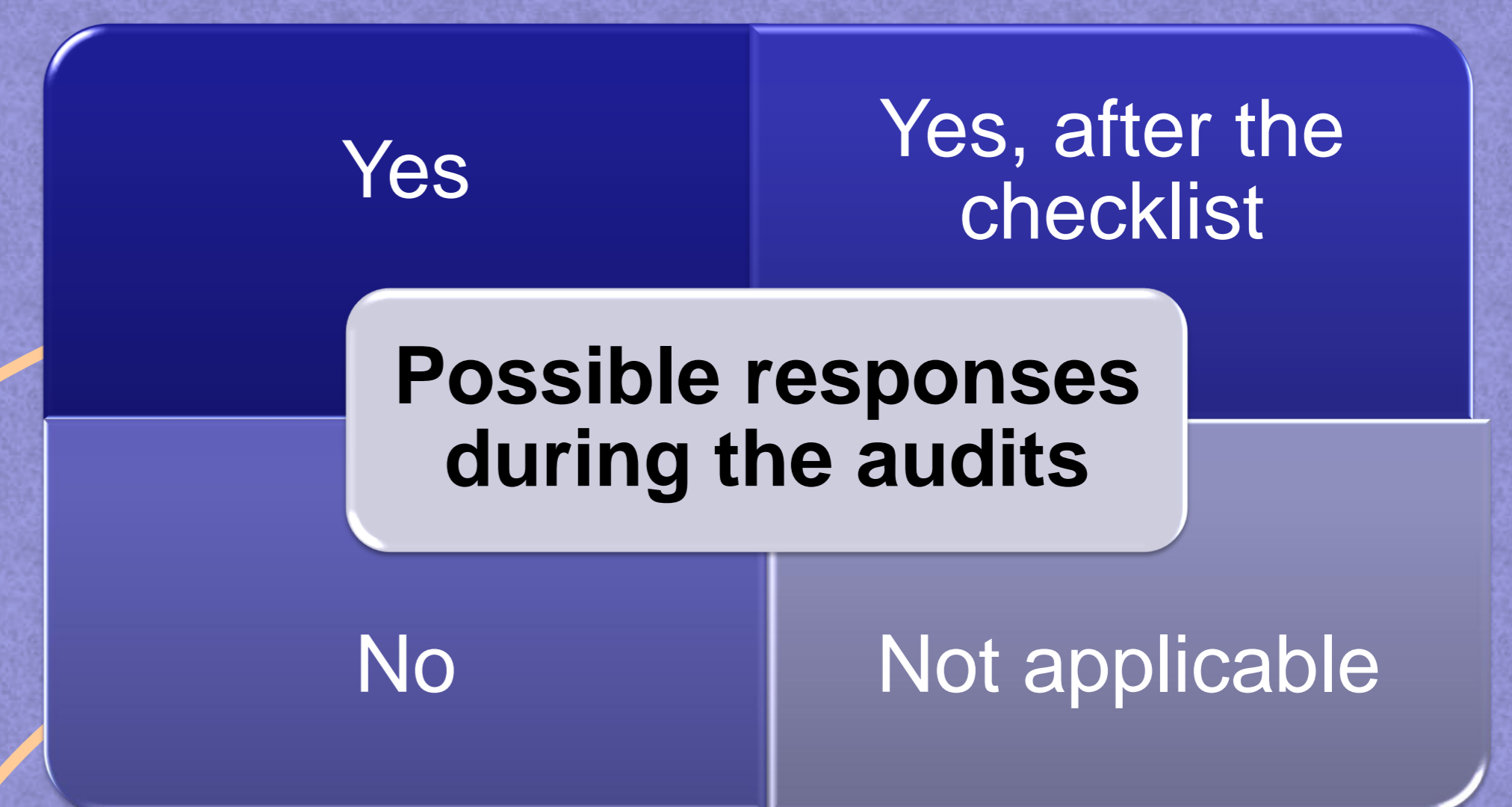
Present a checklist designed to improve the pharmacotherapeutical care process

Present the results obtained with this tool in our ICU

## Methods

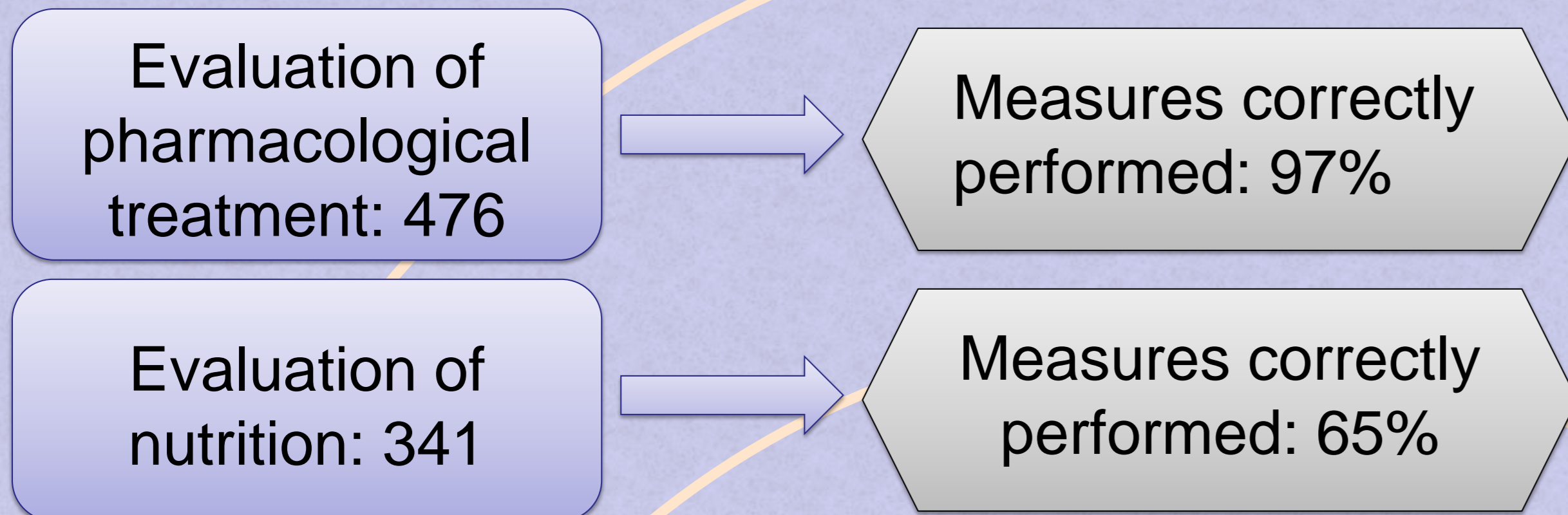


This was a prospective study conducted over a period of **one year** in one adult ICU (14 beds). The checklist, consisted of **37 safety measures**, 10 of them focused on treatment.



The evaluated **pharmacological treatment** and **nutritional measures** were: allergies, correct prescription, indication and dosage, verbal orders, prophylaxis of thromboembolic disease, gastrointestinal hemorrhage, glycemic control, antibiotic adequacy, enteral nutrition monitoring and parenteral assesment.

## Results



Multivariate analyses didn't demonstrate significant changes in the pharmacological care process when variables were analyzed quarterly, except for **improving lack of verbal prescription** (26% to 2.2%  $p < 0.05$ ) and improving **management of nutrition** (58,33% to 72.62%  $p < 0.05$ ). Furthermore, audits were useful to detect errors of omission and to correct them promptly in 8.3%.

	February – May		June – September		Octubre - Enero		p	
	Nº	%	Nº	%	Nº	%		
Prescribed treatment administered correctly. Verbal orders	Yes	143	73.71	125	85.62	133	97.79	<0.0001
	Yes, after	0	0	0	0	0	0	
	No	51	26.29	21	14.38	3	2.21	
Enteral nutrition monitoring	Yes	91	58.33	69	68.32	61	72.62	0.05
	Yes, after	65	41.67	32	31.68	23	27.38	
	No	0	0	0	0	0	0	

## Conclusions

Real-time safety audits in medication help to verify the adequacy of pharmacological orders and can increase safety awareness. The tool has been useful to improve the nutrition management.

# Materiovigilance ex ante risk management

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## Background

Since the publication of the **April 6th 2011 Decree** on the quality management of medicinal treatment and drugs in health institutions, it has become a priority in hospitals. In addition, in version 2010 of the **High Authority of Health certification manual**, criterion 8d deals with the evaluation requirements and risk prioritization based on defined methods, implementation of preventive, mitigation or recovery actions, staff training in risk analysis, and monitoring and measuring the effectiveness of implemented actions.

## Objectives

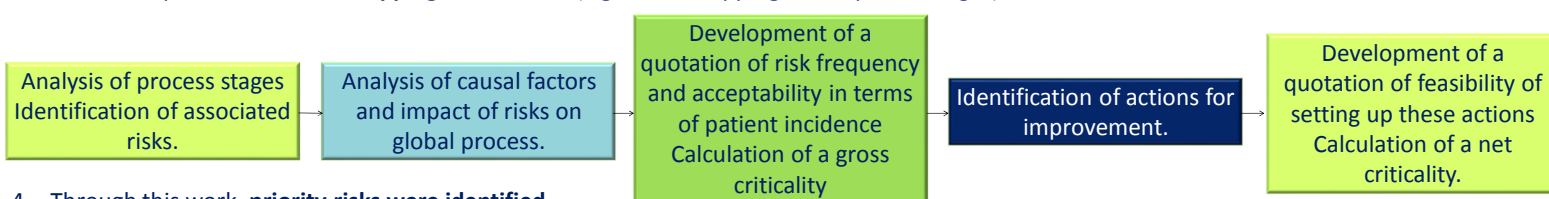
It is in this context that the Organization, Quality, User relations Directorate of our health institution has requested medical device vigilance service to

- initiate a project on quality management.
- develop a materiovigilance ex ante risk assessment tool.

The chosen quality tool was a **risk mapping**, based on the FMEA method (Failure Mode Effects Analyses) which allows to **prioritize risks**, to **identify actions for improvement** and to **develop an action plan**.

## Methods

1. A **multidisciplinary group** was created by the project leader.
2. An inventory of the **service documentary system** was performed.
3. The development of the **risk mapping** was started. (Fig. 1 Risk mapping development stages)



4. Through this work, **priority risks were identified**.

## Results & Discussion

**Five major activities** (bottom-up alerts, top-down alerts, staff, documentary system and computer resources management), about **fifty associated risks** and **many scenarios** were identified.

Due to the risk mapping, **three priority actions** (Net criticality  $\geq 18$ ) have been identified to be implemented :

- reinforce staff training,
- raise awareness on reporting,
- write fallback procedures.

Those three actions were included in the **action plan 2016**.

Score	Level	Description
<b>Frequency score</b>		
1	Rare	Maximum 1/year
2	Occasional	< 1/month
3	Frequent	> 1/month
<b>Acceptability score</b>		
1	Minor	Acceptable
2	Serious	Less acceptable
3	Major	Unacceptable
<b>Mastering score</b>		
1	Excellent	Action already set up and efficient
2	Bad	Action difficult to implement
3	Good	Action to enhance or easy to implement

Fig 2. Risk scoring model

Activities	Stages	Risks	Causal factors	Impact on global process	Frequency	Acceptability	Gross criticality	Actions for improvement	Mastery	Net criticality
Bottom-up alerts management	Reporting	Not reported event	People : lack of knowledge, omission Method : processes Material : reporting tool ineffective Environment : lack of time	Ignorance of an event. No analysis of the event. Risk of reoccurrence.	3	3	9	Enhance HCL staff training	3	27
								Promote awareness on reporting among HCL staff	2	18
								Publication of procedures on intranet portal	1	9
								Dematerialization of reporting	1	9
Top-down alerts management	Sending alert	Not sent alert	People : omission Method : processes Material : fax damaged, inbox overload	Referent person is not informed	2	3	6	Archiving of reception notice	1	6
								Redaction of fallback procedures	3	18
Staff management	Training	Insufficient number of trained person	People : lack of involvement Method : poor communication Environment : lack of time	HCL staff is unfamiliar with materiovigilance	2	3	6	Enhance the organization of HCL Staff training	3	18
								Improvement of communication on staff training	3	18
		Inadequate training for students and residents	People : lack of involvement Material : inadequate training tools, inadequate skills assessment tools Environment : lack of time	Alerts mismanagement	2	3	6	First training lead by the local correspondent of materiovigilance	1	6
								Develop skills assessment tool (questionnaire)	3	18
								Double control by a pharmacist	1	6

Fig 3. Risk mapping (abstract)

## Conclusion

The development of this quality tool is made in the context of the certification of health institutions as well as in the context of a comprehensive approach to improve quality management and patient care in hospitals.

## Acknowledgements

Arrêté du 6 avril 2011 relatif au management de la qualité de la prise en charge médicamenteuse et aux médicaments dans les établissements de santé, Légifrance.

Manuel de certification des établissements de santé, Version 2010, Juin 2009, Haute Autorité de Santé (HAS).

OMEDIT Basse Normandie, OMEDIT Ile-de-France

SOFGRES

# Health-Related Quality of Life and its associated factors among South Asian and Middle Eastern patients with chronic diseases in the UK

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Abstract Number: OHP-001



## Background

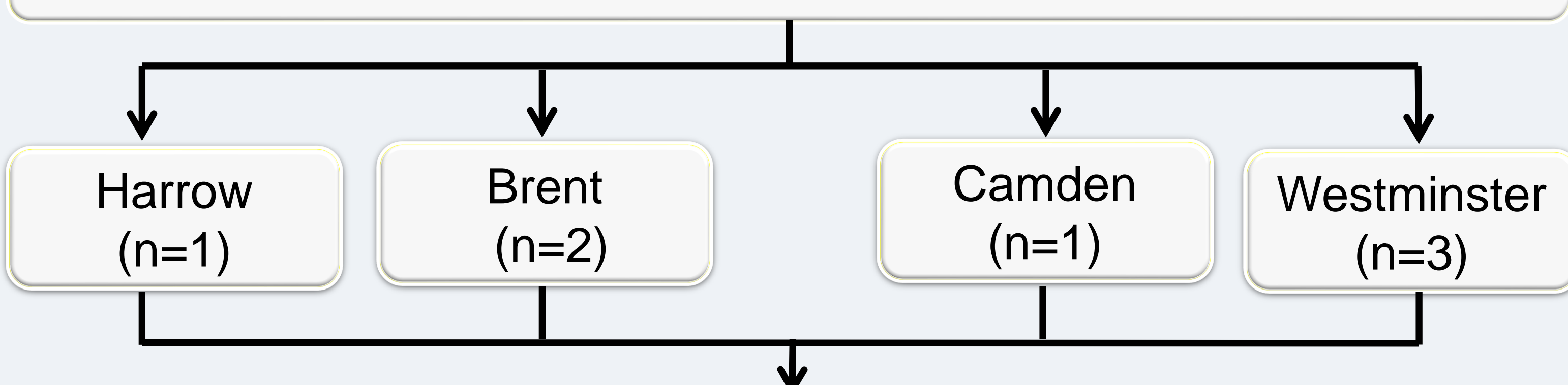
- Ethnic minority groups (EMGs) including South Asians (SA) and Middle Easterners (ME) in the UK are rising.<sup>[1,2]</sup>
- These groups often experience a higher than average prevalence of chronic diseases.<sup>[1,2]</sup>
- People from different cultural backgrounds may experience language barriers, demonstrate different beliefs, needs and experiences which may affect their ability to use medicines and access services effectively.<sup>[1,2]</sup>
- This may lead to poor chronic disease management and health outcomes. Thus, describing EMGs Health-Related Quality of Life (HRQoL) is an important point of interest.

## Purpose

To assess the quality of life among SA and ME patients with chronic diseases in the UK and to investigate factors associated with lower EuroQoL five-dimension (EQ-5D) visual analogue scale (VAS).

## Materials and Methods

The study was conducted with seven community pharmacies in:



Patients from :

- SA and ME origins in the UK,
- aged over 18,
- and prescribed three or more regular medicines for chronic diseases were invited to participate in the study.

Patients were identified when presenting with a prescription

If the informed consent was obtained, the data were collected in face-to-face structured interviews in community pharmacies using EQ-5D-3L.

Information about patients' characteristics, healthcare of the participants, number and type of prescription and non-prescription medicines used by respondents was collected and quantitative procedures were conducted with Software package used for Statistical Analysis (SPSS) 21.

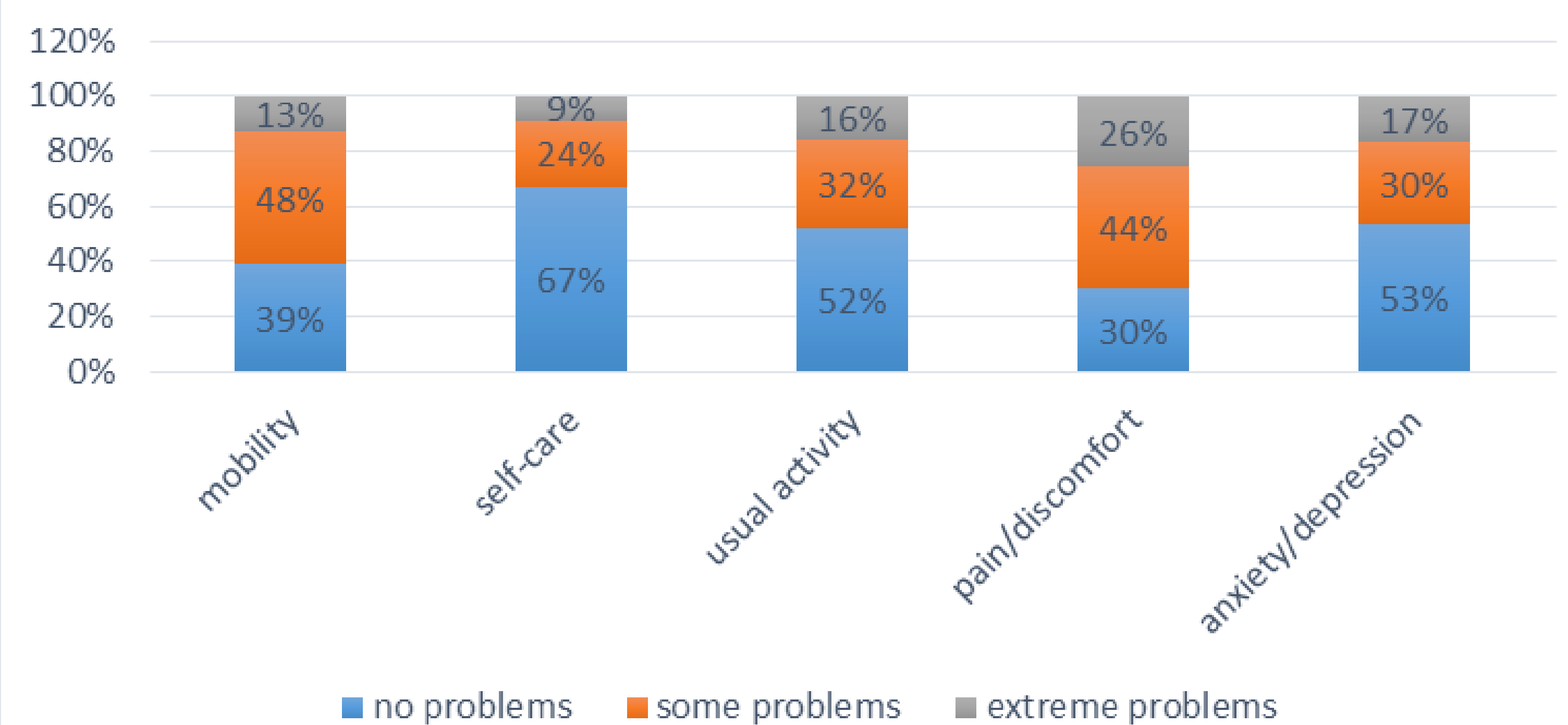
## Reference

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- Alhomoud F, Dhillon S, Aslanpour Z, Smith F. South Asian and Middle Eastern patients' perspectives on medicine-related problems in the United Kingdom. *International Journal of Clinical Pharmacy*, 2015; DOI 10.1007/s11096-015-0103-6.

## Results

Participants (61% male) had mean (SD) age 58 (13.4) years and on a mean (SD) of 8 (4) medicines. Based on the EQ-5D-3L, the most significant problems reported by respondents were pain/discomfort (70%), followed by mobility (61%), usual activities (48%), anxiety/depression (47%), and self-care (33%) (i.e. where some and extreme problems of each dimension were combined), Figure 1. The mean EQ-5D visual analogue self-rating scale (VAS) score for SA and ME patients was 60.0 (SD ± 23.8).

Figure 1: EQ-5D self-reported health states of SA and ME patients



Lower EQ VAS score were associated with the female gender, ME ethnic origin, lower level of education, high number of A&E consultations and emergency GP consultations, Table 1.

Table 1: Factors influencing the EQ-5D visual analogue score in SA and ME patients.

Parameter	EQ VAS Mean (SD)	P value
Gender*		
Male	64.06 (24.12)	0.041
Female	53.92 (22.11)	
Ethnicity*		
South Asian	65.51 (23.92)	0.026
Middle Eastern	54.38 (22.65)	
Education level*		
Above high school	71.67 (19.76)	0.001
High school or below	53.75 (23.58)	
Number of A & E consultations*		
None	69.21 (22.26)	0.001
≥ 1	51 (22.31)	
Number of emergency GP consultations*		
None	65.61 (24.59)	0.003
≥ 1	50.17 (19.66)	

\*Mann-Whitney U test; a p value of <0.05 was taken as conferring statistical significance.

## Conclusions

The results add to the volume of knowledge regarding SA and ME patients' health status. Medical, policy and individual attention should be given to the management of chronic diseases and improvement of QoL in EMGs. Longitudinal studies must be performed to monitor changes in QoL and to permit evaluation of the outcomes of chronic disease intervention programs.



## INNAPPROPRIATE PRESCRIBING IN ELDERLY PATIENTS ATTENDING THE EMERGENCY ROOM

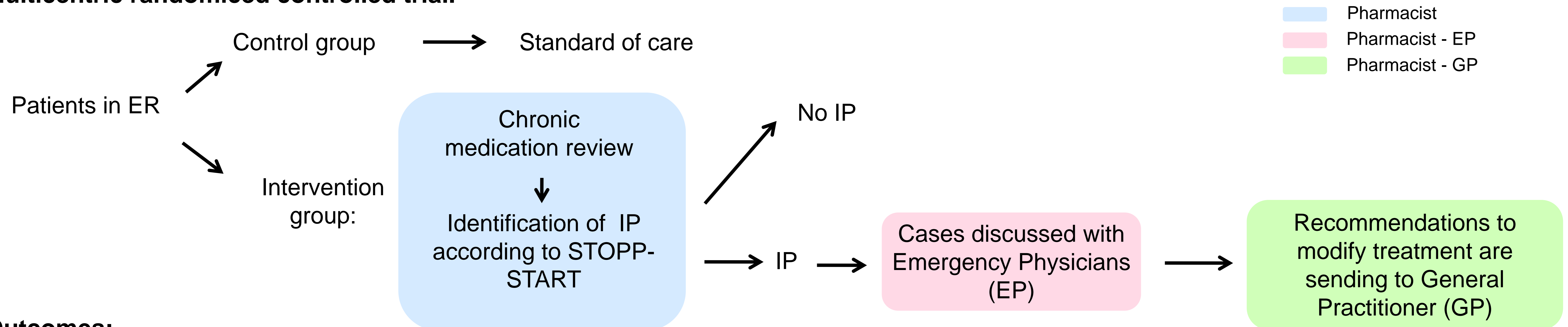
Ana Gines, Isabel Sanchez Navarro, Rosario Santolaya, Nuria Galan, M<sup>a</sup> Teresa Moreno Carvajal, Jesus Sierra, Juan Manuel Rodriguez, Albert Armengol, Silvia García Ramos, Beatriz Calderon, H. Príncipe de Asturias, H. Manacor, H. de Jerez, H. San Llatzer

### Objetives

- 1.- To measure the prevalence of inappropriate drug prescriptions (IP) in elderly patients who attend the emergency room (ER).
- 2.- To assess the influence on emergency visits and hospitalizations of a multidisciplinary health care team project designed to identify and resolve them.

### Study design

#### Multicentric randomized controlled trial.



#### Outcomes:

- Prevalence of IP in elderly patients (final results reported).
- Differences in the rate of hospitalization and emergency visits after one year of follow up (on going).

### Results

#### Patients included: 665

CHARACTERISTICS	CONTROL GROUP(n=342)	INTERVENTION GROUP(n=305)	P
Gender:			0,614
Woman	183 (53,5%)	166 (51,6%)	
Man	159 (46,5%)	156 (48,4%)	
Mean age (SD)	78,2 (7,82)	78,99 (7,59)	0,129
Origin:			0,445
Home	327 (95,6%)	313 (97,5%)	
Social health center	13 (3,8%)	7 (2,2%)	
Charlson adjusted to the mean age (SD)	2,85 (2,3)	3,05 (2,15)	0,077
Number of drugs: median (ICR)	8 (5)	9 (6)	0,008

#### Prevalence:

262/323 patients with IP in the intervention group (81,1%; IC 95%: 76.8 – 85.4).

#### 3243 medication reviewed:

- 303 (9.3%; IC 95%: 8.3 – 10.4) according to STOPP criteria.
- 278 (8.6%; IC 95%: 76.8 – 85.4) according to START criteria.

STOPP CRITERIA	Nº IP	%
Benzodiazepines for ≥ 4 weeks.	111	36,63
Any duplicate drug class prescription.	25	8,25
Long-term aspirin at doses greater than 160 mg per day.	24	7,92
ACE inhibitors or Angiotensin Receptor Blockers in patients with hyperkalaemia.	15	4,95
Any drug prescribed without an evidence-based clinical indication.	10	3,30
Use of regular opioids without concomitant laxative.	9	2,97
Thiazide diuretic with current significant hypokalaemia, hyponatraemia, hypercalcaemia or with a history of gout.	6	1,98
Sulphonylureas with a long duration of action with type 2 diabetes mellitus.	6	1,98
Loop diuretic for treatment of hipertensión with concurrent urinary incontinente.	5	1,65
NSAID and vitamin K antagonist, direct trombin inhibitor or factor Xa inhibitors in combination.	5	1,65
Digoxin at a long-term dose greater than 125 mcg/day if eGFR < 30 ml/min/1.73m <sup>2</sup> .	5	1,65
NSAID if eGFR < 50 ml/min/1.73m <sup>2</sup> .	5	1,65
Long-term NSAID or colchicine (> 3 months) for prevention of relapses of gout.	5	1,65
Hypnotic Z-drugs increase the risk of falls in older people.	5	1,65

START CRITERIA	Nº IP	%
Pneumococcal vaccine according to national guidelines.	134	48,20
Statin therapy with a documented history of coronary, cerebral or peripheral vascular disease.	26	9,35
Seasonal trivalent influenza vaccine annually.	24	8,63
ACE inhibitor with systolic heart failure and/or ischaemic heart disease.	16	5,76
Laxatives in patients receiving opioids regularly.	14	5,04
Calcium and vitamin D supplement in patients with known osteoporosis and previous fragility fracture(s) and/or Bone Mineral Density T-scores more than multiple sites.	9	3,24
Vitamin D supplement in older people who are housebound or experiencing falls or with osteopenia.	9	3,24
Antiplatelet therapy with a documented history of coronary, cerebral or peripheral vascular disease.	7	2,52
ACE inhibitor with congestive heart failure or documented coronary artery disease.	7	2,52
Beta-blocker with ischaemic heart disease.	5	1,80
Regular inhaled beta 2 agonist or antimuscarinic bronchodilator for mild to moderate asthma or COPD.	5	1,80

### Discussion and conclusions

High number of patients in the ER had IP (prevalence= 81.1%). These data are higher than the data found in other studies (35.9% - 61.3%). In our study a high number of recommendations to modify drug treatment in older people have been done. The final results of the study will clarify if these interventions improve clinical outcomes.

This study is promoted and financed by the REDFASTER group of the Spanish Society of Hospital Pharmacy.

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# PROSPECTIVE DETECTION OF ADVERSE DRUG REACTIONS AMONG 2,263 HOSPITALISED CHILDREN OVER A 19 MONTH PERIOD - EREMI INTERMEDIATE REPORT -

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**Background:** Off-label and unlicensed (OLUL) drug use is a dominant practice in paediatrics. Recent observational studies suggest that OLUL drugs are more likely to be responsible for adverse drug reactions (ADRs) in children than licensed medicines (Santos 2008; ADRIIC 2014).

**Purpose:** EREMI study prospectively assess the relationship between OLUL drug use in children (0–15 years, ≥ 3 hospital days) and ADRs occurrence. This EREMI intermediate report describes ADRs detected over 19 months (September 2013 to March 2015) in our children's hospital.

**Material and Methods:** ADRs were detected by the EREMI team (physicians/pharmacists) analysing data extracted from the Hospital Information System (e-HIS): patient medical records, drug administrations, physiological parameters and biological outcomes. Suspected ADRs were validated with the clinical team.

## RESULTS

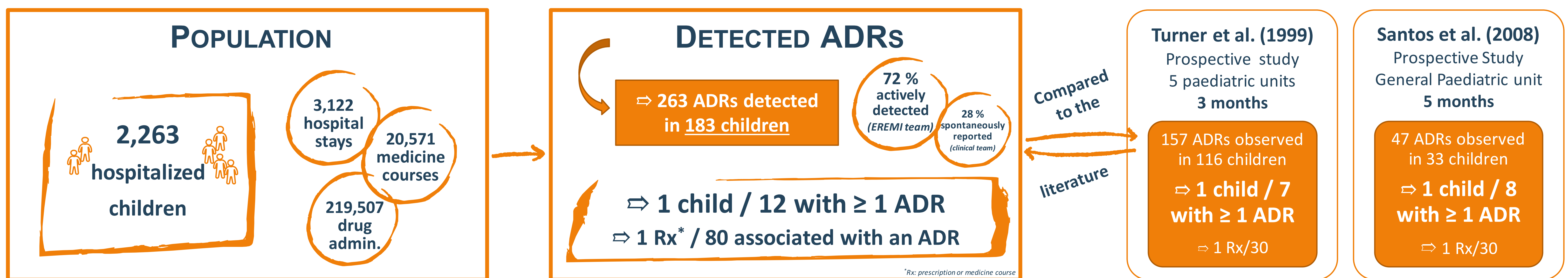


Table 1 – Frequency of observed ADRs within the 7 participating paediatric units.

Paediatric unit	Mean No. of Rx/child	Total No. of ADRs	Proportion of children experiencing ≥ 1 ADRs	Incidence of ADRs based on No. of children
1. Paediatric resuscitation	16	134	29 %	45 %
2. Nephrology / Rheumatology	15	32	10 %	15 %
3. Developmental psychopathology	1	19	9 %	12 %
4. Hepatogastroenterology	15	16	8 %	10 %
5. Neurology / Epileptology	11	25	8 %	9 %
6. Pulmonology	9	31	4 %	8 %
7. Endocrinology, General paediatrics	4	6	1 %	1 %

Table 2 – Observed ADRs coded by affected system organ class (MedDRA).

System organ class	Examples of ADRs	No. ADRs	% of ADRs
1. Metabolism and nutrition	hypokalaemia, decrease appetite	58	22 %
2. Nervous system	somnolence, extrapyramidal syndrome	28	11 %
3. Psychiatric	discontinuation syndrome, irritability	26	10 %
4. Vascular	blood pressure disorders, thrombosis	24	9 %
5. Hepatobiliary	increased transaminases	21	8 %
6. General and administration site	allergic reactions	19	7 %
7. Gastrointestinal	diarrhoea, pancreatitis	18	7 %
8. Blood and lymphatic system	anaemia, neutropenia	16	6 %
10. Skin and subcutaneous tissue	skin reaction	13	5 %
11. Renal and urinary	renal failure, urinary retention	13	5 %
12. Infection and infestations	opportunistic infections	9	3 %
13. Cardiac	cardiac rhythm disorders	8	3 %
14. Respiratory, thoracic and mediastinal	hypoxia	7	3 %
17. Musculoskeletal and connective tissue	tendinitis	2	1 %
19. Eye	corneal ulcer	1	0 %

Table 4 – Examples of ADRs responsible for hospital stay extended (44%)

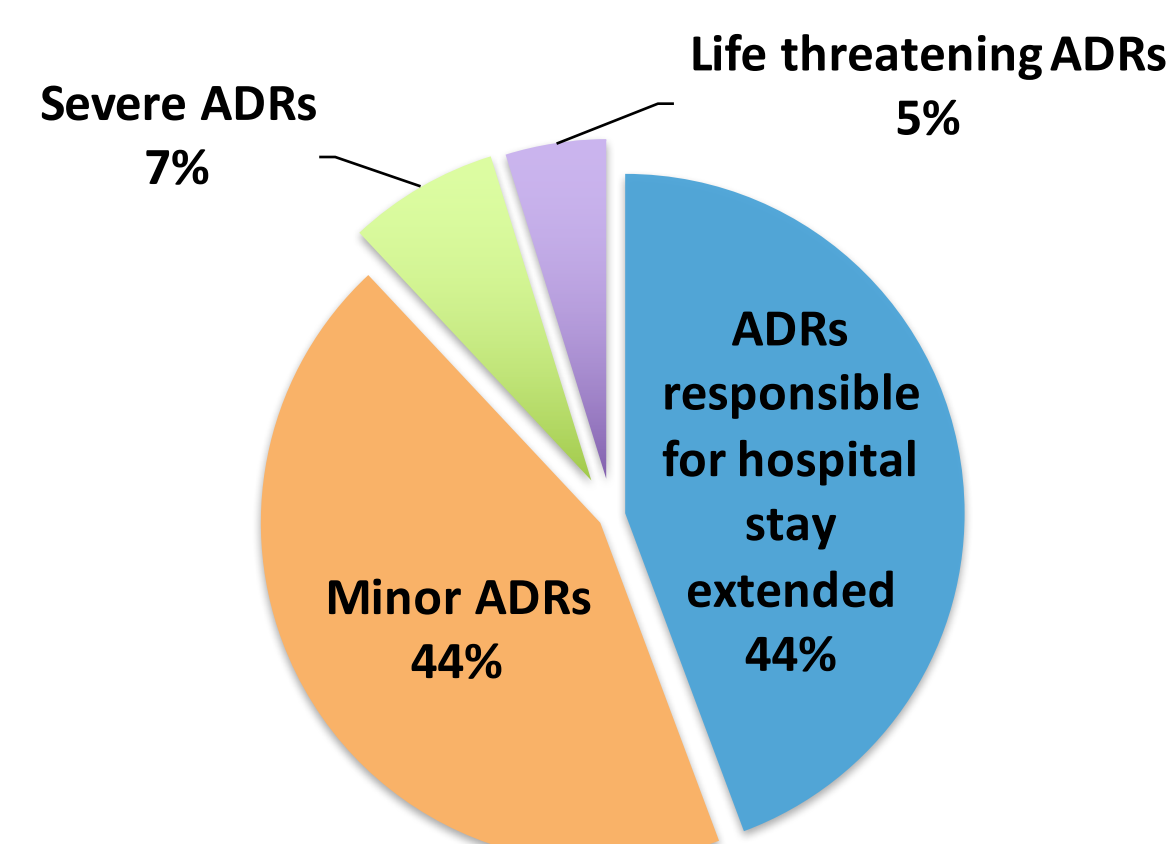
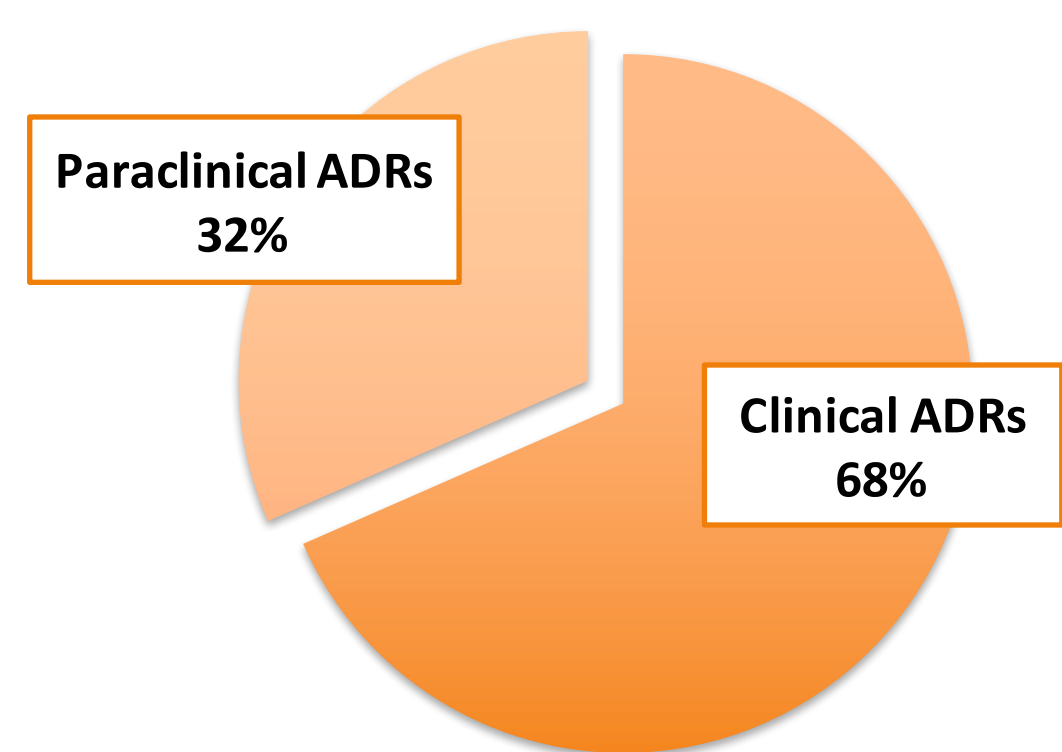
ADRs	Suspected drugs
Acute pancreatitis (2)	⇔ hydrochlorothiazide, VPA
Allergic reactions (4)	⇔ vancomycin, piperacillin/tazobactam, tocilizumab
Interstitial tubulopathy (1)	⇔ carbamazepine

Table 5 – Examples of severe or life threatening ADRs (12%)

ADRs	Suspected drugs
Hypokalaemia (12)	⇔ diuretics
Corneal ulcer (1)	⇔ sufentanil+ midazolam + Nimbex® + Ketamine
Diabetes (1)	⇔ tacrolimus

Table 3 – Most commonly observed ADRs.

ADRs	No. of ADRs	%	Suspected drugs
1. Hypokalaemia	27	16 %	⇔ diuretics, topiramate, methylprednisolone, nalbuphine
2. Discontinuation syndrome	19	7 %	⇔ morphinics, ketamine
3. Somnolence	16	6 %	⇔ cyamemazine, nalbuphine, levetiracetam, vigabatrin
4. Cytolysis and cholestasis	16	6 %	⇔ mycophenolate, methotrexate, rituximab
5. Hypotension	15	6 %	⇔ diuretics, clonazepam, phenobarbital, midazolam
6. Skin reactions	14	5 %	⇔ vancomycin, lamotrigine + VPA



### Discussion and Conclusion:

- ADRs in EREMI compared to the literature:
  - ✓ Almost twice as much children with ≥ 1 ADR;
  - ✓ Twice as much medicine courses per child;
  - ✓ Different units, longer ADR detection period in EREMI;
- As expected, great incidence of ADRs within the resuscitation ward (1 child/3 experiencing ≥ 1 ADR).
- Unanticipated high frequency of ADRs occurrence using psychiatric drugs in children.

### Perspectives:

- Detected ADRs are being reviewed by our Regional Centre of Pharmacovigilance and the EREMI independent committee.
- Majority of ADRs were preventable (e.g.: hypokalaemia, discontinuation syndrome):
  - ⇒ Systematic warning of clinical staff for ADR risks would help in preventing ADRs.
  - ⇒ Collected information will be used to develop an automated tool for the detection of preventable ADRs.

### Acknowledgments:

- ANSM funding; EREMI group.
- Corinne Alberti (Clinical Epidemiology, Inserm-U1123, APHP), Kim An Nguyen (Clinical Centre of Investigation, HCL), Alexis Arzimanoglou (Epilepsy, Sleep, Paediatric Neurophysiology, Inserm-U1028, CNRS-UMRS292, HCL/UCBL-Lyon1), Yannick Aujard (Neonatology, APHP), Odile Boespflug-Tanguy (Paediatric Neurology and Metabolic Diseases, Inserm-U931, CNRS-UMR6247, APHP), Nadine Bossard (Biostatistics, CNRS-UMRS558, HCL/UCBL-Lyon1), Valentine Briant (Pharmacy Department, HCL), Corinne Carcel (Lyon Pharmacovigilance Centre, HCL), Jean-Claude Carel (Paediatric Endocrinology, Inserm-U1141, APHP), Charlotte Castellani (Clinical Centre of Investigation, HCL), Olivier Claris (Neonatology, EAM4128, HCL/UCBL-Lyon1), Pierre Cochot (Paediatric Nephrology/Rheumatology, IBCP-UMR 5305CNRS, HCL/UCBL-Lyon1), Georges Deschênes (Paediatric Nephrology, CNRS-UMR7134, APHP), Vincent Des Portes (Paediatric Neurology, CNRS-UMRS290, HCL/UCBL-Lyon1), Sylvie Di Filippo (Cardiology, EA4173, HCL/UCBL-Lyon1), Xavier Dode (Pharmacy Department, HCL) and the CNHM (Drug Information National Hospital Centre, Thérèse1), Lamia El Amrani (Clinical Center of Investigation, HCL), Pierre Fournere (Child Psychiatry, CNRS-UMRS304, HCL/UCBL-Lyon1), Laure Guittard (Clinical Centre of Investigation, Medical Informatics, Evaluation, Research EPICIME, HCL), Emile Henin (CNRS-UMRS558, UCBL-Lyon1), Evelyne Jacqz-Aigrain (Paediatric Pharmacology and Pharmacogenetics, Clinical Centre of Investigation, Inserm-U1426, APHP), Etienne Javouhey (Paediatric Intensive Care Unit, UMRESTTE, HCL/UCBL-Lyon1), Behrouz Kassai (Clinical Centre of Investigation, HCL), Alain Lachaux (Paediatric Hepatogastroenterology, Inserm-U1111, CNRS-UMRS308, HCL/UCBL-Lyon1), Salma Malik (Clinical Centre of Investigation, HCL), Catherine Michel (Computer and Information System Management, HCL), Yanis Minouni (Clinical Centre of Investigation, HCL), Marie-Christine Mouren-Simeoni (Child Psychiatry, APHP), Marc Nicolino (Paediatric Endocrinology and Metabolic Diseases, Inserm-U1060, HCL/UCBL-Lyon1), Nathalie Paret (Lyon Pharmacovigilance Centre, HCL), Benjamin Riche (CNRS-UMRS558, HCL/UCBL-Lyon1), Aurélie Portefaix (Clinical Centre of Investigation, HCL), Corinne Pulce (Toxicovigilance and Poison Control Centre, HCL), Jean-Marc Saporio (Toxicovigilance and Poison Control Centre, HCL), Anne-Marie Schott (Medical Informatics, Evaluation, Research EPICIME, Inserm-U1033, HCL/UCBL-Lyon1), Thierry Vial (Lyon Pharmacovigilance Centre, HCL).