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MOST FREQUENT DRUG-RELATED EVENTS DETECTED BY PHARMACEUTICAL ANALYSIS OF COMPUTERIZED PHYSICIAN ORDER ENTRY AND PROPOSED SOLUTIONS

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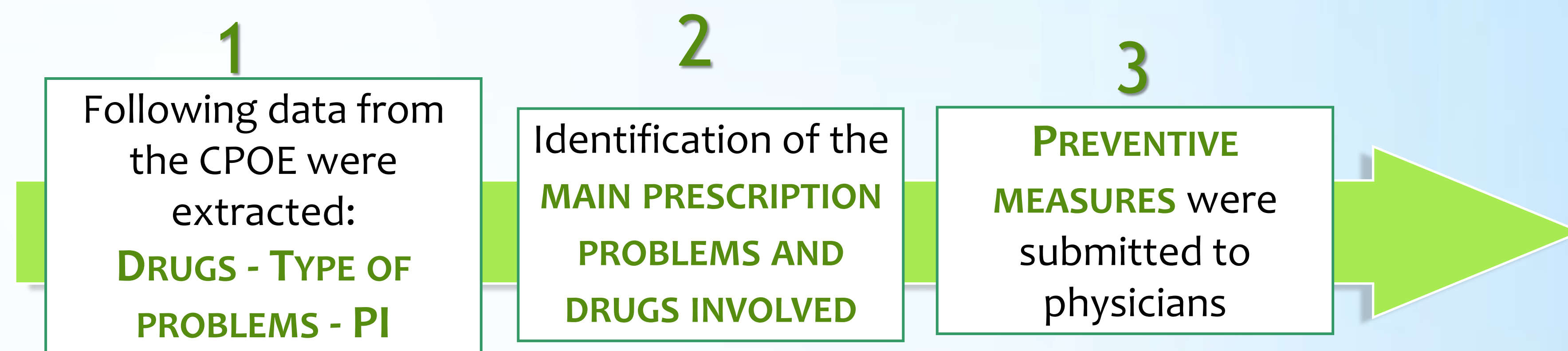
BACKGROUND

In 2012, Toulouse University hospital implemented a Computerized Physician Order Entry (CPOE) in two digestive surgery departments (41 inpatient beds). Clinical pharmacists on the wards contribute to secure the medication process by reviewing prescriptions.

PURPOSE

1- To highlight recurrent and avoidable drug-related problems identified by pharmaceutical analysis of CPOE

2- To raise physicians' awareness regarding these prescription problems

MATERIAL & METHODS

From April to July 2012, **Pharmaceutical Interventions (PI)** concerning prescription problems were **recorded in the CPOE** (according to the codification defined by the working group of the French Society of Clinical Pharmacy)
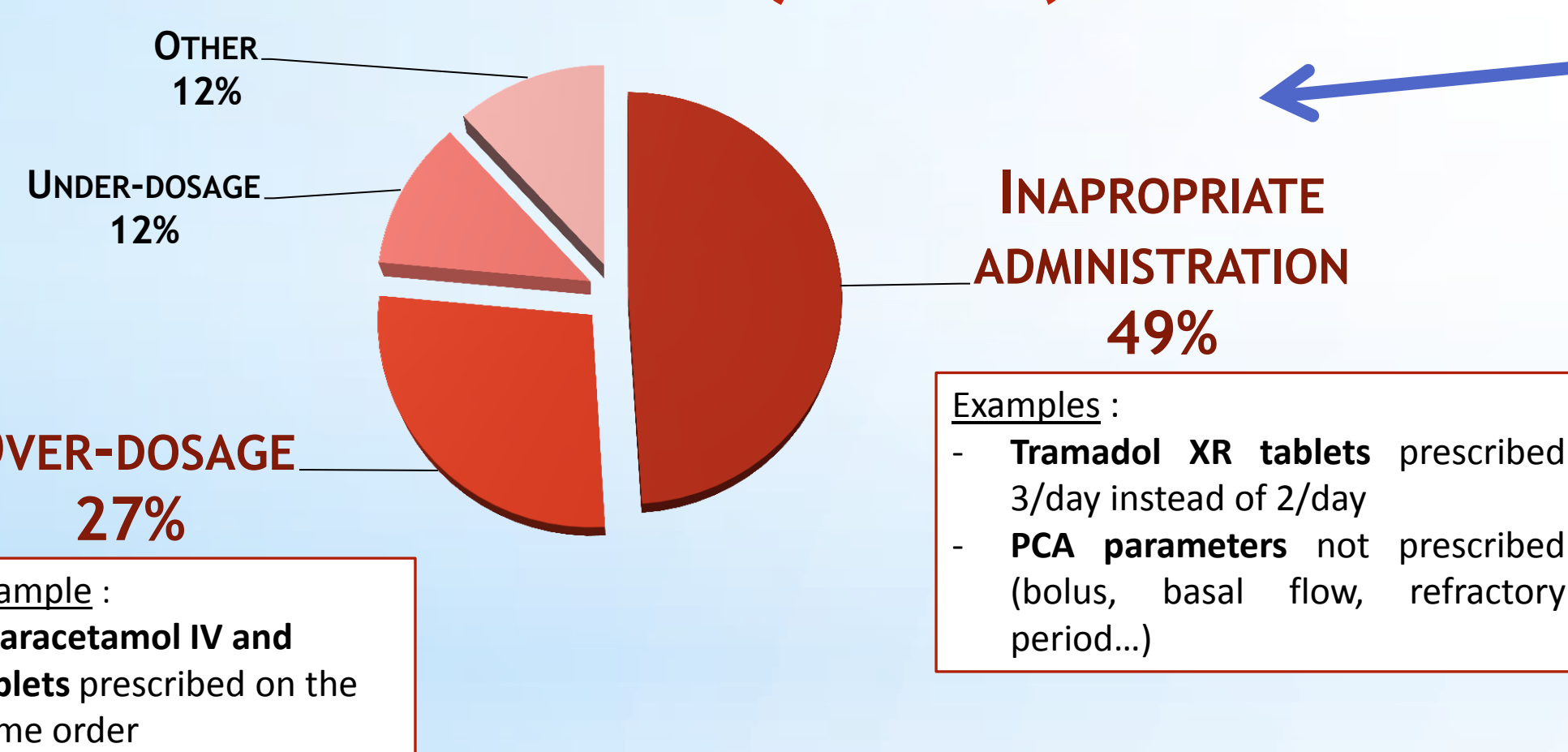
1 Following data from the CPOE were extracted: **DRUGS - TYPE OF PROBLEMS - PI**

2 Identification of the **MAIN PRESCRIPTION PROBLEMS AND DRUGS INVOLVED**

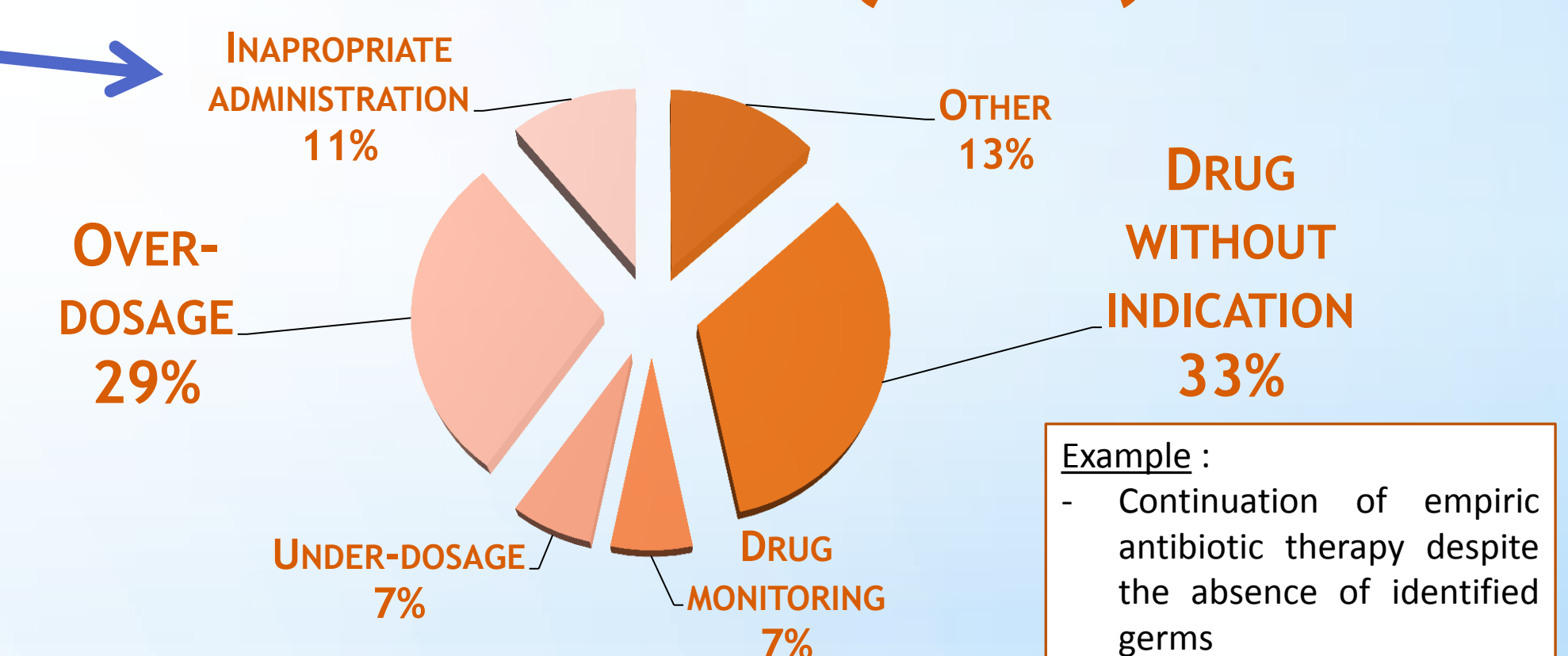**3** **PREVENTIVE MEASURES** were submitted to physicians

RESULTS

2396 prescriptions were analysed and **450** Pharmaceutical Interventions (PI) were accepted by physicians (**18.8%**)
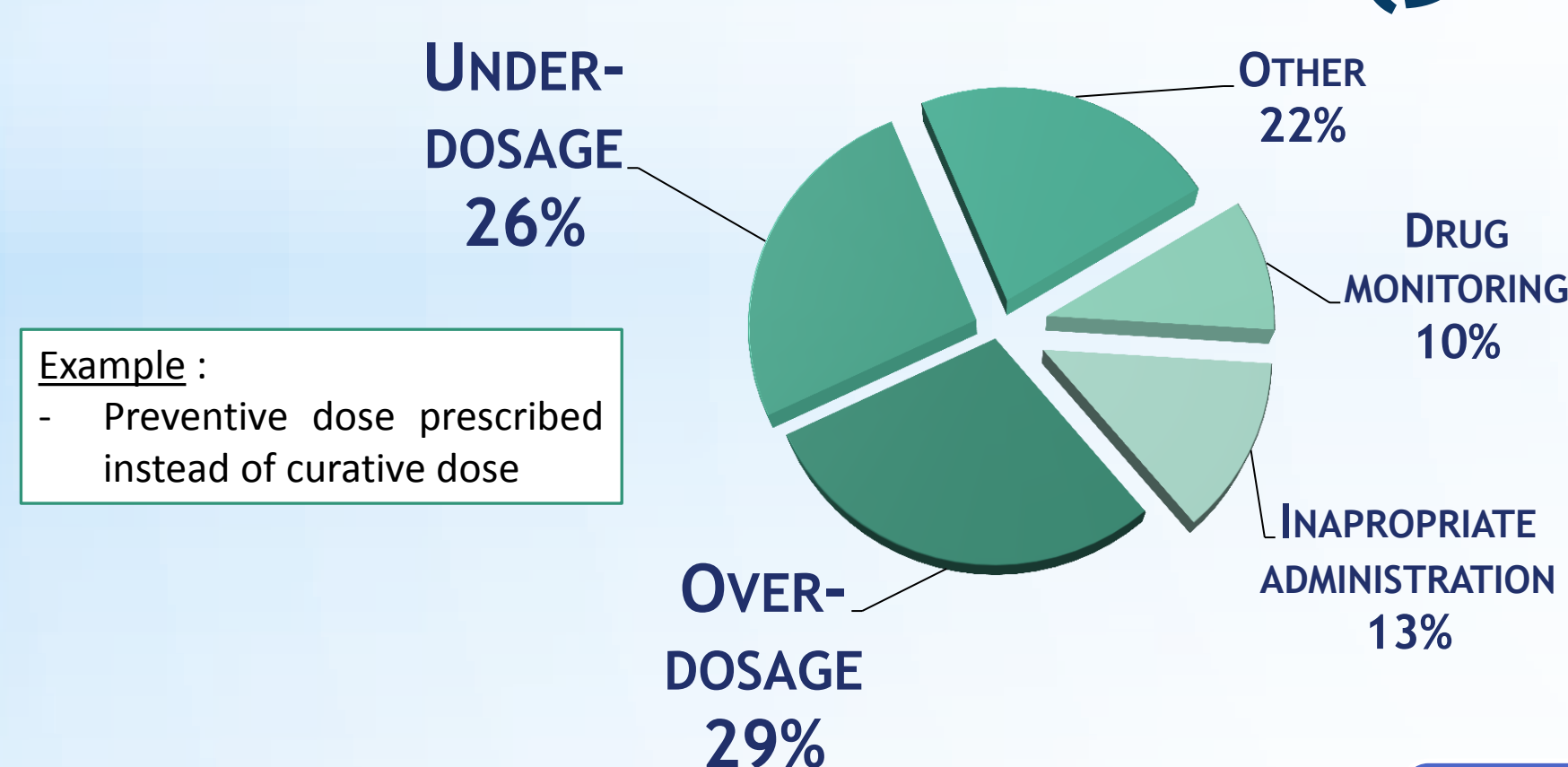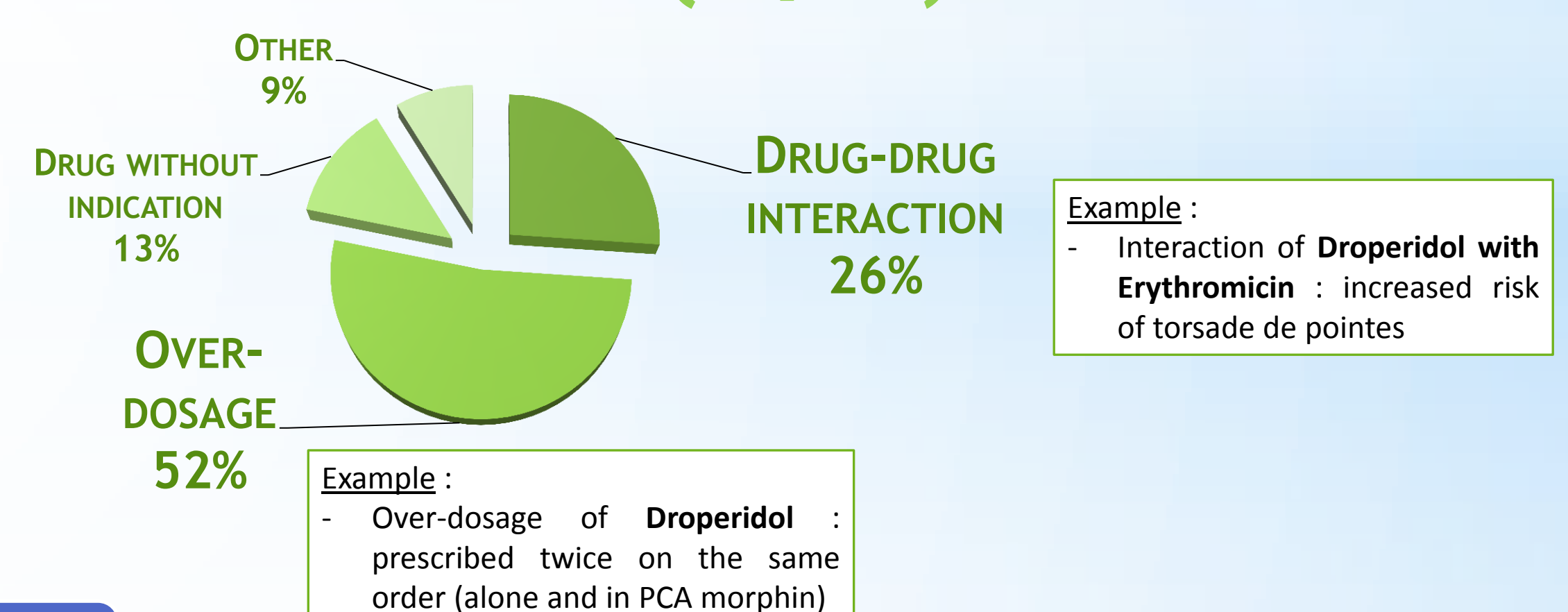
MAIN PRESCRIPTION PROBLEMS

ANALGESIS (52 PI)

- OTHER 12%
- UNDER-DOSAGE 12%
- OVER-DOSAGE 27%
- INAPPROPRIATE ADMINISTRATION 49%

Examples :
- **Tramadol XR tablets** prescribed 3/day instead of 2/day
- **PCA parameters** not prescribed (bolus, basal flow, refractory period...)

Example :
- **Paracetamol IV and tablets** prescribed on the same order

ANTIBIOTICS (16 PI)

- INAPPROPRIATE ADMINISTRATION 11%
- OVER-DOSAGE 29%
- UNDER-DOSAGE 7%
- DRUG MONITORING 7%
- OTHER 13%
- DRUG WITHOUT INDICATION 33%

Example :
- Continuation of empiric antibiotic therapy despite the absence of identified germs

HEPARINS (31 PI)

- UNDER-DOSAGE 26%
- OTHER 22%
- DRUG MONITORING 10%
- INAPPROPRIATE ADMINISTRATION 13%
- OVER-DOSAGE 29%

Example :
- Preventive dose prescribed instead of curative dose

ANTIEMETICS (24 PI)

- OTHER 9%
- DRUG WITHOUT INDICATION 13%
- OVER-DOSAGE 52%
- DRUG-DRUG INTERACTION 26%

Example :
- Interaction of **Droperidol with Erythromicin** : increased risk of torsade de pointes

Example :
- Over-dosage of **Droperidol** : prescribed twice on the same order (alone and in PCA morphin)

PREVENTIVE MEASURES

POCKET GUIDE made by pharmacists to help new residents while prescribing

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MULTI-DISCIPLINARY STAFF was organised with physicians, nurses and pharmacists **TO REVIEW STANDARDIZED ORDER SETS** and **TO DISCUSS ABOUT DRUG PROBLEMS IDENTIFIED**

→ **ANTIEMETICS :**
- No risk of **DROPERIDOL OVER-DOSAGE** (when prescribed alone and in PCA morphin) because of the low dose in the PCA
- **STOP** prescribing **ONDANSETRON TABLETS** for post-operative nausea and vomiting

→ **ANTALGICS :**
- Review of **STANDARDIZED ORDER SETS OF PCA**
- New order sets to promote the prescription of **ORAL PARACETAMOL AND ORAL TRAMADOL**

POCKET GUIDE PRESCRIPTION

Heparins prescription

Available medication at Toulouse University Hospital :
- HNF: **Calciparine** SC 12500 IU/0, 5 ml and 20 000 IU/0, 8 ml;
Heparin sodium 25 000 IU / 5 ml
- LMWH: **Lovenox** SC 4000UI; 6000UI; 8000UI; 10 000UI; **Innohep** 10 000UI; 14 000UI 18 000UI

Absolute Contraindications in curative treatment in case of severe renal failure (Cl_crea < 30 ml/min)

Relative Contraindications :
- In curative treatment in case of moderate renal failure (Cl_crea < 60 ml/min)
- In preventive treatment in case of severe renal failure (Cl_crea < 30 ml/min)

Dosage:

Dosage	Calciparine	Lovenox	Innohep
Preventive	0.2 ml 2/day In surgery with high thrombogenic risk, dose can be increased to 0.2 ml 3/day with aPTT monitoring	Surgery with moderate thrombogenic risk : 2000UI/day Surgery with high thrombogenic risk : 4000UI/day	/
Curative	Starting dose: 500UI/kg per 24 hours in 2-3 inj/day	100UI/kg/inj 2/day	175UI/kg in 1 inj/day

Monitoring:

Monitoring	Calciparine	Lovenox	Innohep
Platelets	2/wk	2/wk	
	No monitoring in preventive ttt	No monitoring in preventive ttt	
Anti-factor Xa determination	In curative ttt: First determination between the first two inj. Repeat dosage after each change of dose	In curative ttt (in the case of renal failure, under and overweight, hemorrhage) First determination 4 h after the 3rd inj. Repeat dosage 2 days after each change of dose	

Antalgics prescription

MORPHIN
Remember to prescribe PCA parameters (in the prescription comments):
Bolus:... mg
Basal flow:... mg/h
Refractory period... min
Dose max 4 h:... mg

TRAMADOL
Available medication at Toulouse University Hospital :
- TRAMADOL IV 100 mg. Dose : every **4-6 h.** Maximum 600 mg/day
- TOPALGIC 100, 150, 200 mg extended released tablets. Dose : **2/day** every 12 hours.
- IXPRIM (37, 5 mg of tramadol immediate release + 325 mg paracetamol). Dose : every **4-6 h.** Maximum 8 tablets/day

Antibiotics therapy

Antibiotics therapy must be adapted according to microbiological results.
In case of empiric antibiotic therapy, the treatment must be reviewed (according to the identified germ/ clinical signs) after 48h/72h, then after d7/d10 of treatment.

Post-operative nausea and vomiting therapy

Available medication at Toulouse University Hospital :
- ONDANSETRON 2 mg/ml IV.
- ZOPHREN (ondansetron) 4, 8 mg tablets
- DROLEPTAN (droperidol) 2, 5 mg/ml IV.
- PRIMPERAN (metoclopramide) 10mg/2ml IV
- PRIMPERAN (metoclopramide) 10mg tablets

Standardized order sets of post-operative nausea and vomiting therapy
- DROLEPTAN 1.25 mg 2/day
- ONDANSETRON if DROLEPTAN is insufficient : 4 mg by slow intravenous injection
Duration of treatment : from J0 to J2 (or 3 days)

ZOPHREN oral is reserved for treating nausea and vomiting induced by cytotoxic treatments.

Optimization of drug administration

Drugs to be taken at morning :
Proton pump inhibitors
Beta blockers
Diuretics

Drugs to be taken at night :
Alfuzosin
Statins
Vitamin K antagonists (VKA)

Drugs to be taken at distance from other therapies:
Diosmectite
Antacids

CONCLUSION

This study describes the most frequent CPOE problems.

Communication and collaboration with physicians and nurses are the key to decrease avoidable adverse drug events and to secure CPOE.