Impact of 'Check of Medication Appropriateness' (CMA) in optimizing analgesic prescribing

Charlotte Quintens[1], Johan De Coster[2], Lorenz Van der Linden[1], Bart Morlion[2], Egon Nijns[2], Bart Van den Bosch[2], Willy E. Peetermans[2] and Isabel Spriet[1]
charlotte.quintens@uzleuven.be
[1]Pharmacy Department, University Hospitals Leuven, Leuven, Belgium
[2]University Hospitals Leuven, Leuven, Belgium

4CPS-336
M01- Antiinflammatory and antirheumatic products

Background

- **Pain therapy in inpatients is regularly suboptimal** and might be improved by clinical pharmacy services.
- In our hospital, we have implemented a software-supported **'Check of Medication Appropriateness' (CMA):** a centralized pharmacist-led service comprising a **clinical rule-based screening for potentially inappropriate prescriptions (PIPs),** and a subsequent **medication review by clinical pharmacists.**

Aim:
- To investigate the **impact of the CMA on pain-related prescribing**.

Table 1. **Set of clinical rules incorporated in the CMA targeting pain therapy**

Clinical rule	Recommendations n (%)	Acceptance %
Paracetamol dose adjustments	545 (32.4%)	54.2%
Opioid-induced constipation	489 (29.1%)	90.5%
High pain scores in postoperative patients	159 (9.4%)	76.5%
Ketorolac use for more than 48h without a PPI	152 (9.0%)	81.2%
NSAID use without a PPI in patients with risk factors for peptic ulcer disease/bleeding	113 (6.7%)	90.0%
NSAID use in renal insufficiency	86 (5.1%)	81.4%
Double NSAID therapy	45 (2.7%)	82.4%
Concomitant use of IV and oral NSAID	27 (1.6%)	100%
Concomitant use of IV and oral paracetamol	23 (1.4%)	100%
Opioid-induced nausea and/or vomiting	18 (1.1%)	100%
Interactions with patient controlled analgesia	17 (1.0%)	86.7%
Deprescribing of opioids	9 (0.5%)	44.4%
Total	**1683 (100%)**	**74.3%**

NSAID: non-steroidal anti-inflammatory drug; PPI: proton pump inhibitor.

Figure 1. **Observed proportions of residual PIPs over time**

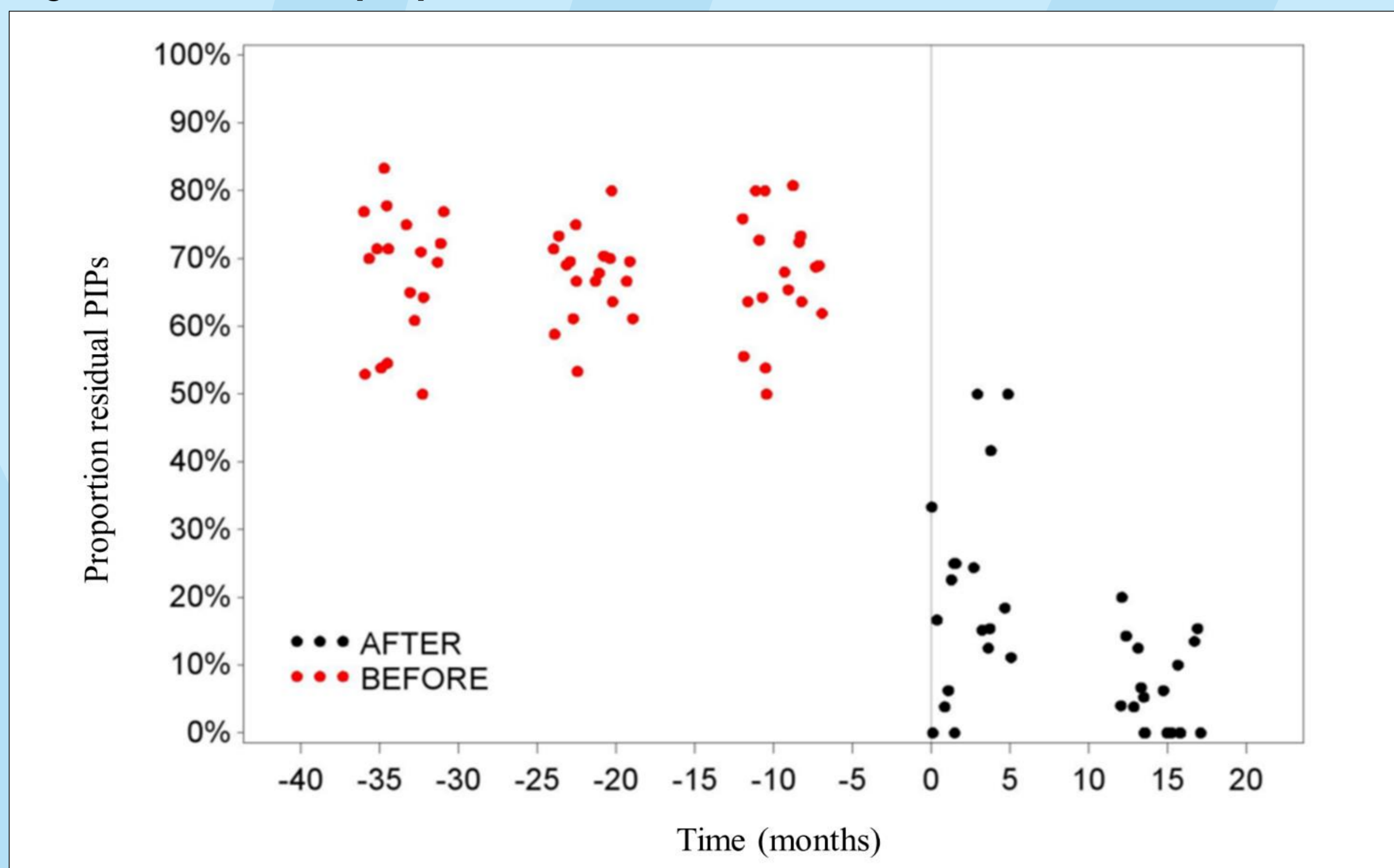Table 2. **Parameter estimates, standard errors and p-values from the segmented regression analysis**

	Estimate	Standard Error	*p*-value
Intercept (β_0)	0.6887	0.0847	<0.0001
Pre-intervention trend (β_1)	1.0002	0.0035	0.9465
Change in level after CMA (β_2)	0.3418	0.1660	***<0.0001***
Post-intervention trend	0.9328		***0.0003***
Change in trend after CMA (β_3)	0.9326	0.0196	***0.0004***

Methods

- A quasi-experimental study was performed in a large teaching hospital, using an **interrupted time series (ITS)** design.
- Pre-implementation, patients were exposed to standard of care. Afterwards, a **pain-focused CMA comprising 12 specific clinical rules** pertaining to analgesic prescribing were implemented in the post-implementation period (Table 1).
- All inpatients admitted to wards exposed to the CMA were eligible for study enrollment. Data were collected for a sample of randomly chosen days pre-implementation (from January 2016 to December 2018) and post-implementation (from January 2019 to July 2020).
- PIPs were identified by running the rules on retrospective patient data (pre-implementation) and prospectively in the CMA (post-implementation). A **residual PIP was identified** if the PIP persisted present after 48h without (pre-implementation) or with the intervention of the CMA (post-implementation).
- A **regression model** was used to assess the impact of the intervention on **the number of pain-related residual PIPs** between both periods. The model consisted of an intercept (β_0), pre-intervention trend (β_1), change in level (β_2) and change in trend (β_3).
- For the post-implementation period, the **number of pain-related CMA recommendations** and the **acceptance rate** were documented during the first year after implementation (January 2019-December 2019).

Results

- Figure 1 shows the **proportion of residual PIPs during the ITS study period**. At baseline, the median proportion of residual PIPs was 69.0% (range: 50-83.3%) with a median number of 13.1 (range: 9.5-15.8) residual PIPs per day. After the CMA intervention, the median proportion and median number decreased to 11.8% (range: 0-50%) and 2.2 (range: 0-9.5) per day.
- Post-implementation, the proportion of residual PIPs was 34% (β_2=0.3418; 95% CI 0.25-0.47) of the pre-implementation proportion. Clinical rules showed **an immediate relative reduction of 66% (p<0.0001)** in pain-related residual PIPs (Table 2).
- A **significant decreasing time trend** was observed during the **post-implementation period** (0.9328; 95% CI 0.90-0.97) (Table 2).
- Post-implementation, **1683 recommendations** were given over one year of which **74.3 % were accepted** by the physicians (Table 1).
- Mean age of patients for whom a recommendation was given, was **58.7 years** (SD±20). Recommendations were most frequently formulated for patients admitted to surgical wards, i.e. **abdominal sg (14.7%), trauma sg (14.0%) and thoracic sg (9.9%)**.

Discussion

➢ We proved that our CMA approach improved analgesic prescribing, as the number of pain-related residual PIPs was reduced in a **highly significant and sustained manner**.

➢ The downward trend in the proportion of residual PIPs in the post-implementation period might indicate that pharmacotherapeutic recommendations induce a **learning effect resulting in a higher acceptance rate over time**.

➢ As a result, **more pharmacist involvement** and the **use of clinical rules,** to improve prescribing during hospital stay, should be further promoted to optimize pharmacological pain management.