

Clinical pharmacy in Belgium:
from the bedside to the basement
(and back to the bedside?)

EAHP SEMINAR – COMBINING CENTRALISED AND BEDSIDE CLINICAL PHARMACY

EAHP 2021 - Isabel Spriet

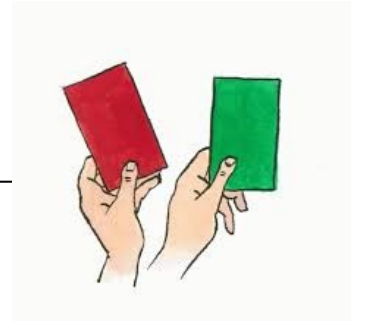
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Dpt. of Pharmaceutical and Pharmacological Sciences, University of Leuven

Conflicts of interest

- Nothing to disclose

Self-assessment questions



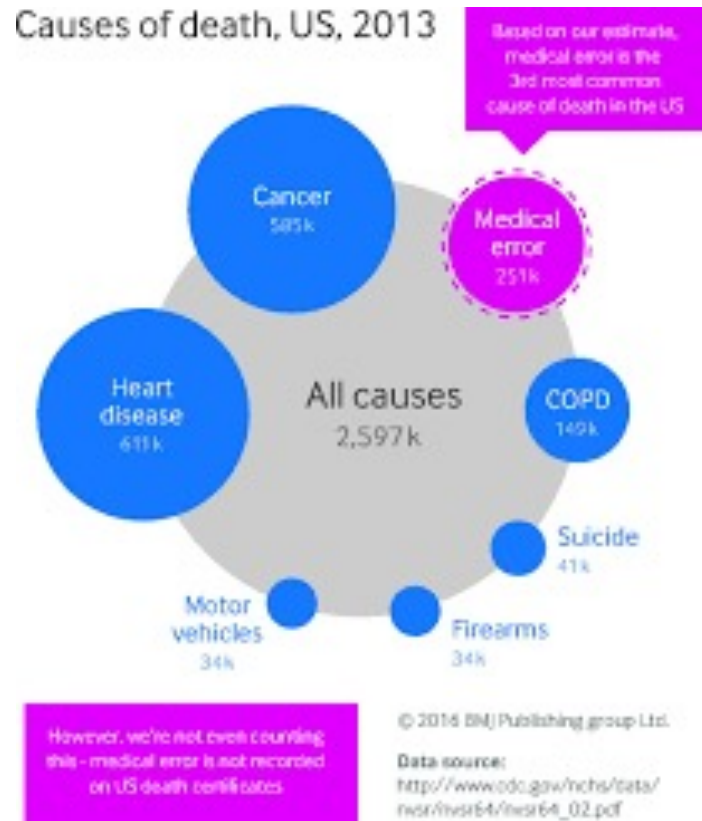
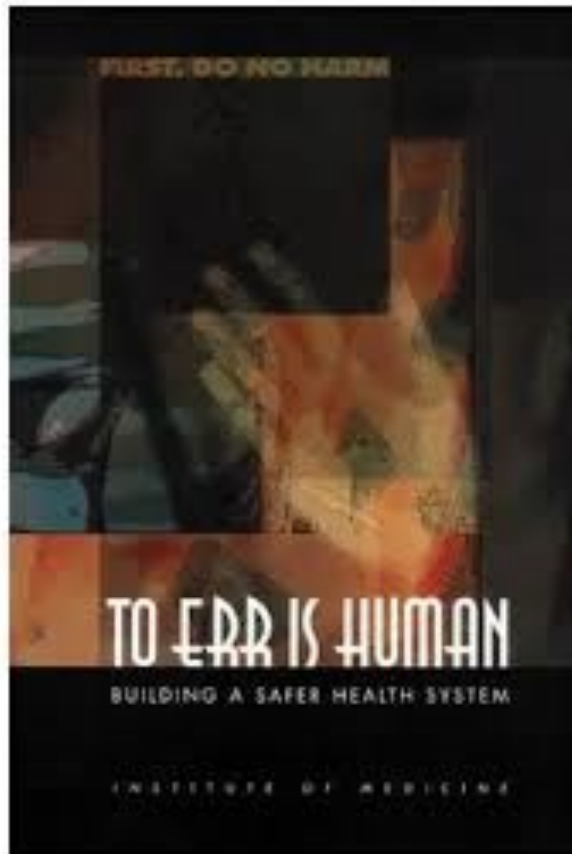
- Can back-office clinical validation contribute to hospital-wide medication safety?
- Is it interesting to organise clinical pharmacy-services in a risk-based way?
- Can back-office clinical validation replace front-office clinical pharmacy services?

Learning objectives



- Discuss the potential contribution of back-office clinical validation to overall clinical pharmacy services
- Understand the risk-based approach of back-office clinical validation
- Reflect about the ideal way of organising clinical pharmacy services in your (financial) context

A “momentum” for the startup of clinical pharmacy



- Institute of Medicine, 1999
- 44,000-98,000 deaths/yr
- Medical errors – 8th leading cause of death in the US

- Makary & Daniel, BMJ 2016
- Medical errors – 3th leading cause of death in the US

Key element to improve quality of care: optimization of patients' pharmacotherapy

A “momentum” for the startup of clinical pharmacy

- Other elements creating the “momentum”:
 - A large (ageing) population characterized by **polypharmacy**
 - **Complex medication** entering the market: NOAC, oral anticancer drugs, ...
 - Shift to **shorter LOS**
 - Initiation of **fixed drug budget** for hospitalized patients in 2006 in Belgium

Shift in the role of the hospital pharmacist



- **USA, Canada, UK, Australia**
 - Bedside clinical pharmacy implemented on patient wards since the '80s
- Development of clinical pharmacy services in **Belgium** since 2000

Development and implementation of CDSS

- Since 2000: digitalization with EHR including electronic prescribing
- Active contribution of clinical pharmacists to the development and implementation of CDSS



CDSS - basic

- (Drug-drug) interactions
- Maximum doses
- Drug use during pregnancy/lactation
- Therapeutic duplication
- Drug allergy

Overzicht Hos | Overzicht Hos V2 | Insuline Pomp | SC-pomp | Shockbox spoed | Chemo-PTS-KS | (Thuis)therapie | Ambulant voorschrift | Vaccinatie

Voorschrift | Schema Verlengen | 9 dagen | Dat 10-05-2019 00:00 | Max. 0 | GM ↔ GM 0 0 14 | GM x 2 4 | A 0 | wv 0 0 0
GM ↔ Voeding 3 | Pijnscore -1 | AM 0

Geen berichten

Medicatie	Toed.	vr 10-05	za 11-05	zo 12-05	ma 13-05	di 14-05	wo 15-05	do 16-05	vr 17-05	za 18-05
PANTOMED (TABL 40 MG)	PO	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg
PRIMPERAN (TABL 10 MG)	PO	10 mg	10 mg	10 mg	10 mg	10 mg	10 mg	10 mg	10 mg	10 mg
CLEXANE (SPUIJT 20 MG/0,2 ML ERIS)	SC	20 mg	20 mg	20 mg	20 mg	20 mg	20 mg	20 mg	20 mg	20 mg
ASAFLOW (TABL 80 MG)	PO	80 mg	80 mg	80 mg	80 mg	80 mg	80 mg	80 mg	80 mg	80 mg
MINITRAN (PLEISTER 10 MG)	TRANSDERM	1 pleister	1 pleister	1 pleister	1 pleister	1 pleister	1 pleister	1 pleister	1 pleister	1 pleister
EMCONCOR (DRAG 2,5 MG MINOR)	PO		2,5 mg		2,5 mg		2,5 mg		2,5 mg	
EMCONCOR (DRAG 5 MG MITIS)	PO	5 mg		5 mg		5 mg		5 mg		5 mg
BELSAR PLUS (COMP 20-12,5 MG)	PO	1 tabl	1 tabl	1 tabl	1 tabl	1 tabl	1 tabl	1 tabl	1 tabl	1 tabl
ZOCOR (TABL 40 MG)	PO	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg	40 mg
CONTRAMAL (TABL RETARD 50 MG)	PO	50 mg	2*50 mg	2*50 mg						
TRADONAL (TABL ODIS 50 MG)	PO	4*50 mg	4*50 mg	4*50 mg						

bij pijn om de 6 uur

Development of bedside 'front-office' clinical pharmacy services

- Partially funded by the Belgian government, first as “pilot projects” followed by structural funding
- **Front-office services**
 - Attending ward rounds
 - Medication reconciliation on admission
 - Medication review
 - Medication counseling at discharge
 - Projects focusing on high-risk drugs, DDI, antibiotic stewardship...




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 Taylor & Francis
Taylor & Francis Group

ORIGINAL PAPER

 Check for updates

Development of clinical pharmacy in Belgian hospitals through pilot projects funded by the government

A. Somers^{a,b}, A. Spinewine^{a,c}, I. Spriet^{a,d,e} , S. Steurbaut^{a,f}, P. Tulkens^{a,g} , J. D. Hecq^{a,h} , L. Willems^{a,i} , H. Robays^{a,j}, M. Dhoore^{a,k}, H. Yaras^{a,l}, I. Vanden Bremt^{a,l}  and M. Haelterman^{a,m}



Somers A et al. *Acta Clin Belg.* 2019, 74(2):75-81

Front-office services in Leuven – 2021

GERIATRICS

Medication review

PEDIATRIC HEMATO- ONCOLOGY

Discharge counseling,
pharmacotherapeutic
advice

TRAUMA WARD

Antimicrobials,
anticoagulation, pain
management

EMERGENCY DPT.

Medication
Reconciliation,
intoxication, CV diseases

HEMATOLOGY – HSCT WARD

Medication Review

HEMATOLOGY – CL CONSULTATION

DDI - DHI

HYPERTENSION CLINIC

Medication Review

MULTIDISCIPLINARY ID MEETINGS

Antimicrobials

CPS on each ward/consultation are provided by teams of 3 pharmacists – continuity of care

Front-office services in Leuven – KPIs 2019

- **Geriatric ward:**
 - 1386 pharmacotherapeutic advices:
 - Acceptance rate: 86%
- **Pediatric ward:**
 - 1129 pharmacotherapeutic advices:
 - Acceptance rate: 92%
- **Case discussions MID meeting trauma ward/septic orthopedic ward**
 - 429 pharmacotherapeutic advices
 - Acceptance rate: 96%

Highly experienced bedside clinical pharmacist can contribute significantly (number of advices) and advice is highly appreciated and implemented (acceptance rate)

Development of bedside 'front-office' services

- FTE hospital pharmacists/ 100 beds



17.9



0.9

(0.24 (Bosnia) – 4.35 (UK))

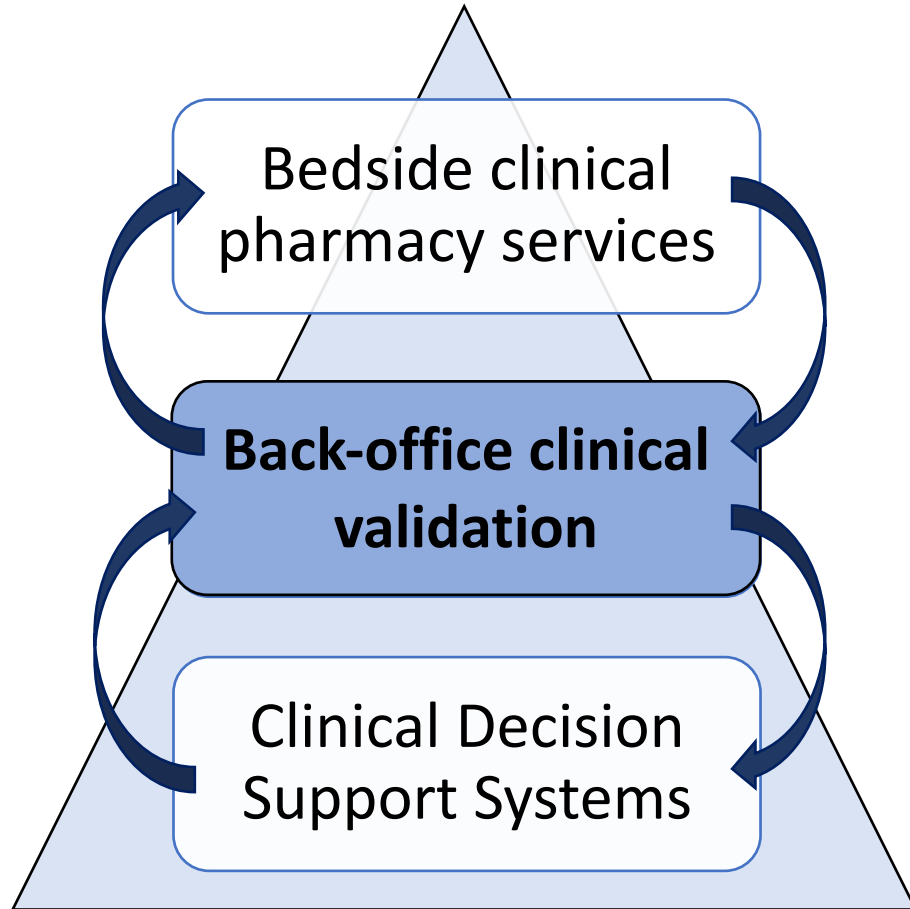


1.2

→ Implementation of bedside CP only on "high risk"-wards

→ CDSS & limited bedside CP do not cover all medication-related problems/risks

The need for 'back-office clinical pharmacy' – clinical validation



Back-office clinical pharmacy

Clinical Validation Check of Medication Appropriateness (CMA)

Screening of patients at risk for potentially inappropriate prescriptions based on explicit clinical rules

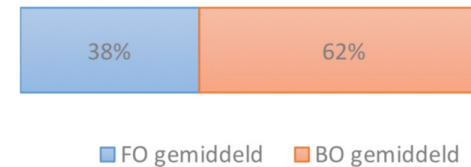
Potentially inappropriate prescriptions are screened by clinical pharmacist

Back-office clinical pharmacy services

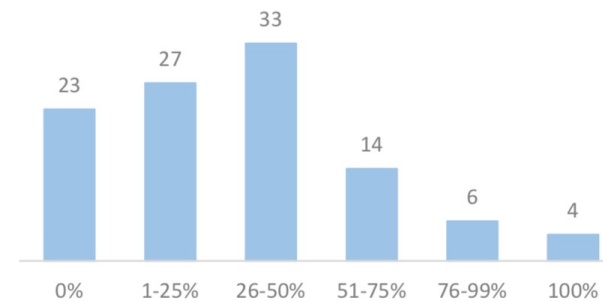
- Triggered by digitalization
- High-risk vs. all prescriptions
- Before or independent from distribution
- Stimulated by JCI – “Check of medication appropriateness”
- “Low” staff investment
- Popular in Belgium

2.6. Verdeling van de activiteiten tussen *Back Office* en *Front Office*

De klinisch-farmaceutische activiteiten kunnen zich afspelen in een specifieke zorgeenheid (bv. : intensieve zorgen), of transversaal met een doelgroep van patiënten in heel het ziekenhuis. Die doelgroep wordt bepaald door een gemeenschappelijk kenmerk (pathologie, farmacotherapie, leeftijd,...). Die activiteiten gebeuren dus op een gedecentraliseerde manier (in de zorgeenheid, aan het bed van de patiënt = *Front Office*), en/of op een gecentraliseerde manier (in de ziekenhuisapotheek = *Back Office*).



Figuur 13: gemiddelde tijdsverdeling tussen FO en BO



Figuur 14: aantal ziekenhuizen in functie van de verdeling van de tijd in FO

Gemiddeld wordt 62% van de klinisch-farmaceutische activiteiten uitgevoerd vanuit de ziekenhuisapotheek (BO) tegenover 38% die plaatsvinden in de zorgeenheden (FO). Het aandeel van de activiteiten in *Front Office* is met 9% toegenomen ten opzichte van 2015.

Bij nader inzien, merken we een zekere variabiliteit in de verdeling. Drieëntwintig ziekenhuizen passen de klinische farmacie enkel gecentraliseerd toe, terwijl in 10 ziekenhuizen meer dan 75% van de activiteiten plaatsvinden binnen de diensten. Anderzijds voeren iets minder van de helft van de ziekenhuizen de klinische farmacie tussen 26 en 75% van de tijd gedecentraliseerd uit.

Back-office clinical pharmacy - credits to the Netherlands!

Original research

Development of a computerised alert system, ADEAS, to identify patients at risk for an adverse drug event

M K Rommers,¹ M H Zegers,¹ P A De Clercq,² M L Bouvy,³ P H E M de Meijer,⁴ I M Teepe-Twiss,¹ H-J Guchelaar¹

ABSTRACT

Introduction Adverse drug events (ADEs) are frequent and pose an important risk for patients treated with drugs. Fortunately, a substantial part of ADEs is preventable, and computerised physician order entry with a sophisticated clinical decision support system may be used to reach this goal.

Objective To develop a new automated system that could improve the quality of medication surveillance. The system should focus on detecting patients at risk for an ADE by combining data from the hospital information system and computerised physician order entry (drug prescription data, drug–drug interaction alerts, clinical chemical laboratory parameters, demographic features), using clinical rules.

Methods The clinical rules were formulated in

pharmacists to take corrective actions before harm occurs.

In our hospital, the CPOE system in use provides online drug–drug interaction checks and drug-dosing checks but is not integrated with a sophisticated CDSS.⁶ This current surveillance system has some limitations: (1) there is no possibility to adapt medication surveillance to categories of patients and/or to medical specialities,⁷ (2) the system does not take into account relevant laboratory values, and (3) most alerts are of low clinical relevance with the consequence of “alert fatigue”.⁸

Given these limitations and the wish for more clinical pharmacy activities, we aimed to develop a new pharmacy decision support system that could improve the quality of our medication



gaston

Menu | Contact

Elke professional zijn eigen data

gaston hospital

Gaston Hospital is beslissingsondersteunende software die als een spin in het web moeiteloos met elk ziekenhuisinformatiesysteem overweg kan. Het biedt uw ziekenhuisorganisatie een systeem dat alle data logisch met elkaar combineert, filtert en deelt. Zo krijgt elke zorgprofessional voortaan alleen zijn eigen, relevante medische informatie. Van arts tot manager.

Modules - Gaston Hospital

Richtlijn Module

Beslis Module

Afhandel Module

Vraag Module

De Beslis Module (DCS) zorgt voor de uitvoering van de richtlijnen die zijn ingevoerd met de richtlijneditor. Het laat de computer alle benodigde stappen uitvoeren. Deze DCS communiceert met alle informatiesystemen rond de patiënt, zoals het EPD, het huisartsinformatiesysteem (HIS), het apotheekstelsel (AIS), het ziekenhuisinformatiesysteem (ZIS), het anesthesietoestel of de patiënten monitor, maar ook met het elektronische systeem van de stadsapotheek of het streeklaboratorium (LIS).

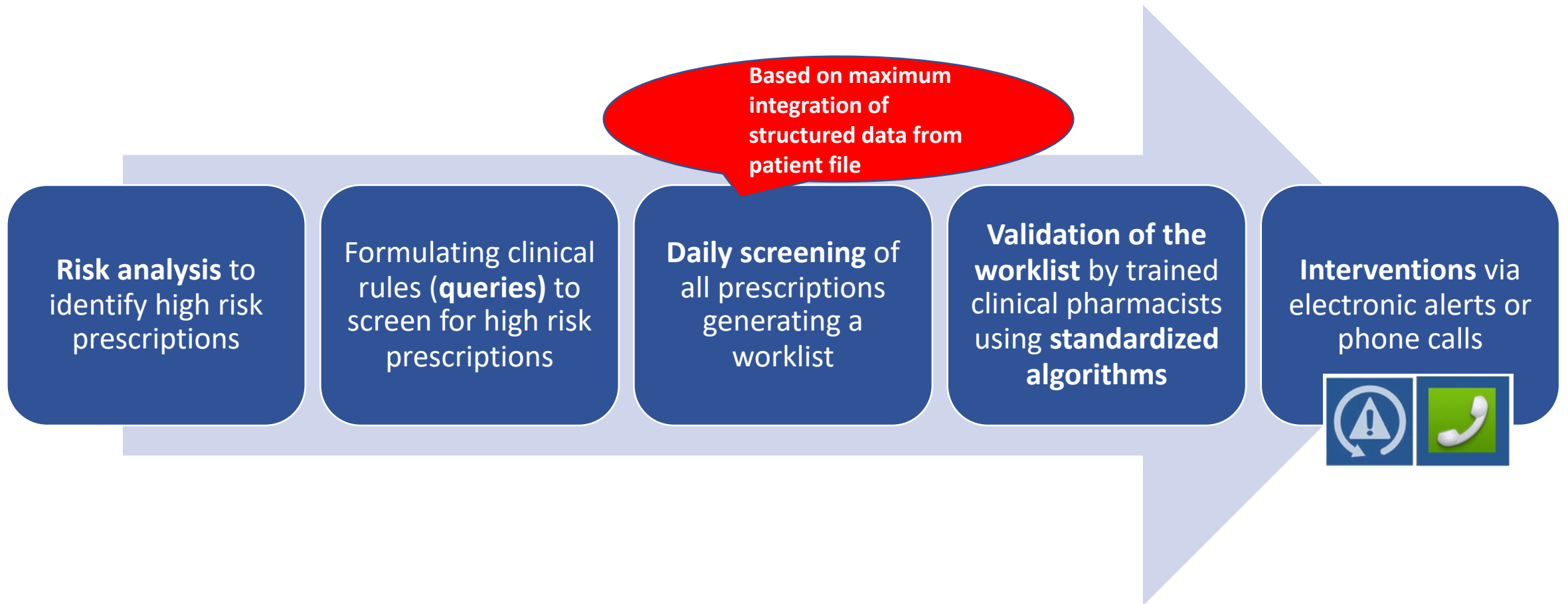
Rommers MK et al. *Artif Intell Med.* 2013, 59:15-21

Rommers MK et al. *Drug Saf.* 2011, 34:233-42

Rommers MK et al. *Qual Saf Health Care.* 2010, 19(6):e35

Wasylewicz ATM et al. *J Clin Pharm Ther.* 2019 Dec 24

CMA: what's in a name?

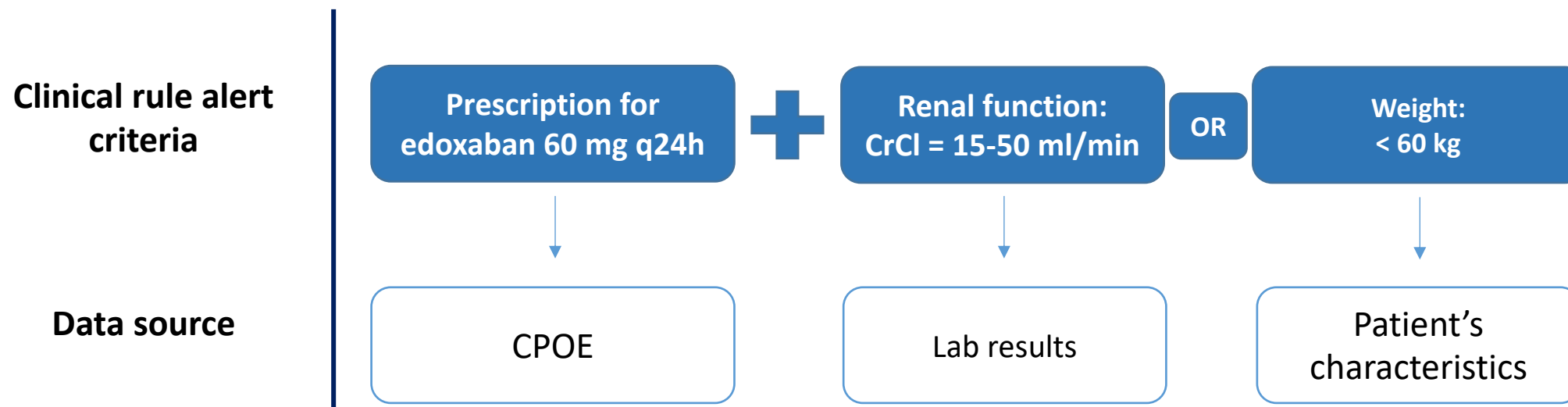


CMA: what's in a name?

Risk analysis to identify patients at risk for PIM

Formulating **advanced clinical rules** to screen for high risk patients

Example: screening for incorrect dosing of edoxaban



CMA: what's in a name?

Example: screening for incorrect dosing of edoxaban

30 prescriptions/day for edoxaban



Prescription for edoxaban
60 mg



> 1000 CrCl analyses daily



CrCl = 15-50 ml/min



= Worklist of < 3 lines/day to be checked by a clinical pharmacist

Daily hospital-wide screening of all EHR generating a worklist

Based on maximum integration of structured data from EHR

CMA: what's in a name?

Daily hospital-wide screening of all EHR generating a worklist

Example: screening for incorrect dosing of edoxaban

The screenshot displays a clinical decision support system (CMA) interface. On the left, a filter panel lists various CMA rules, with 'CMA edoxaban dosis (17)' selected. The main table shows a list of patients with columns for date, status, severity, data, and patient ID. The patient with ID 651 is highlighted. On the right, a detailed view for patient 651 shows the CMA alert 'CMA edoxaban dosis' with a severity of 'Afgewerkt?' (checked). The alert text includes: 'Klik Niet akkoord indien onterecht in deze lijst.' and '04 03 2019 jhias1'. Below the alert, there are buttons for 'Ja' and 'Niet akkoord'. A box contains the following information:

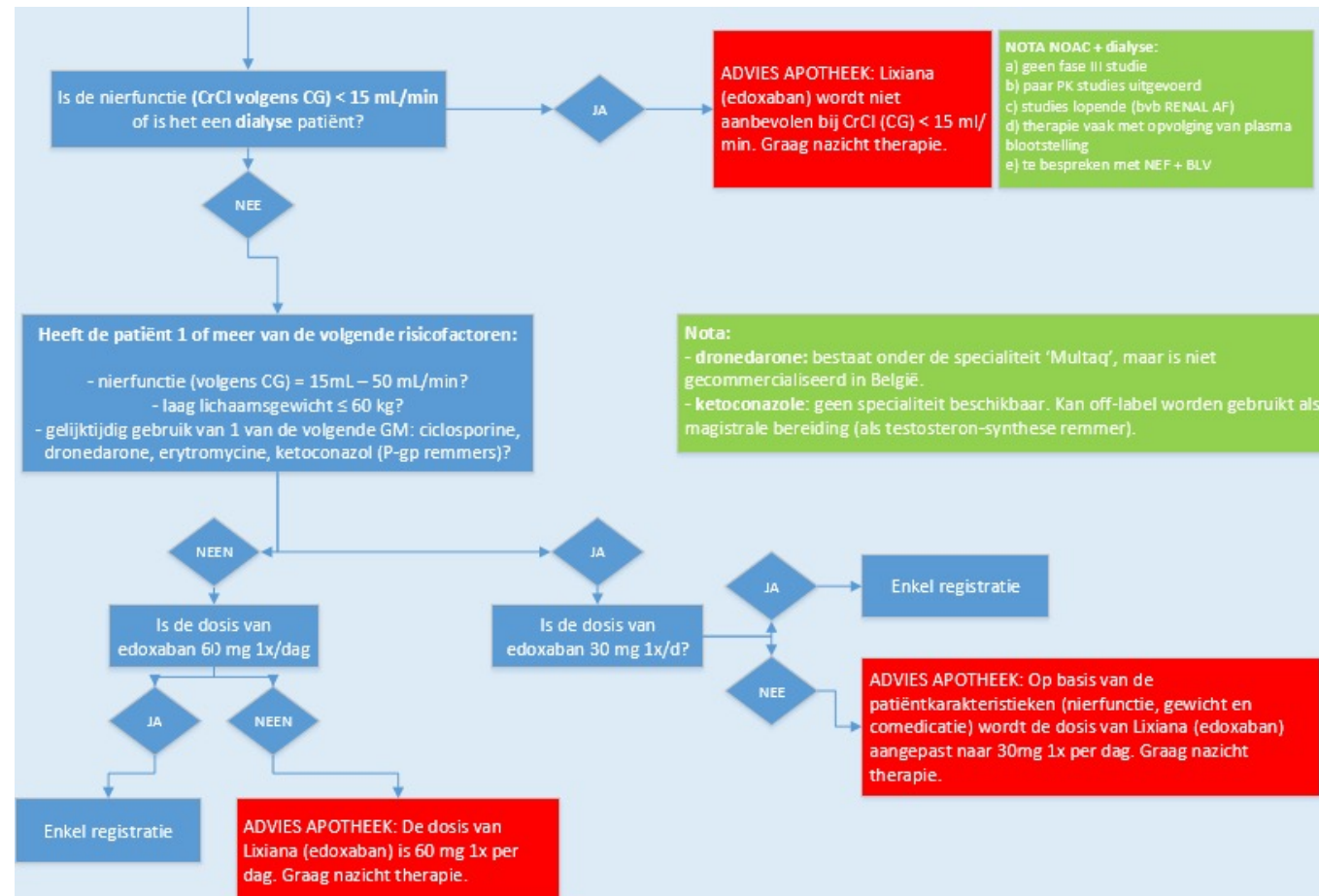
- Wintermute bericht De recentste Cockcroft & Gault eGFR waarde uit de labo resultaten (severity = Cockcroft & Gault waarde * 10) gevonden op 2019-03-07
Severity: 680 [501, ∞]
- Volgende criteria werden ingesteld:
FPgewicht [-30d, 0d]
FPgewichtW [60 , ∞]
- Recentste zorgregistraties die voldoen aan deze criteria:
Zorgregistratie van FPgewicht { FPgewichtW = 61.9, FPgewichtBMI = true } voor patient 80740731 uitgevoerd door [uitvoerder: x258278](#) op 2019-03-03 11:22:11.
- Voorschrift voor LIXIANA uit te voeren op 2019-03-08 08:00:00 en gevalideerd door [validator: dmertel](#) op 2019-03-02 22:37:33.
In de periode van 2019-03-08 00:00:00 tot 2019-03-08 23:59:59 waren er elke dag voorschriften

Below the alert, there are suggestions for the report: 'Interne nota voor apotheek', 'Bekijk EMV', 'Bekijk laboresultaten', and 'Bekijk zorg'. At the bottom, there is a section for 'Maak opvolgnota' with the text: '04 03 2019 jhias1 25962208 ADVIES APOTHEEK: De standaarddosis van Lixiana (edoxaban) bedraagt 60 mg 1x per dag. Dosisreductie is pas aangewezen bij een matige nierinsufficiëntie (15-50 ml/min) of bij een lichaamsgewicht =< 60 kg. Graag nazicht therapie.'

CMA: what's in a name?

Validation by trained clinical pharmacists using standardized flowcharts

Example: screening for incorrect dosing of edoxaban



Interventions via electronic alerts or phone calls

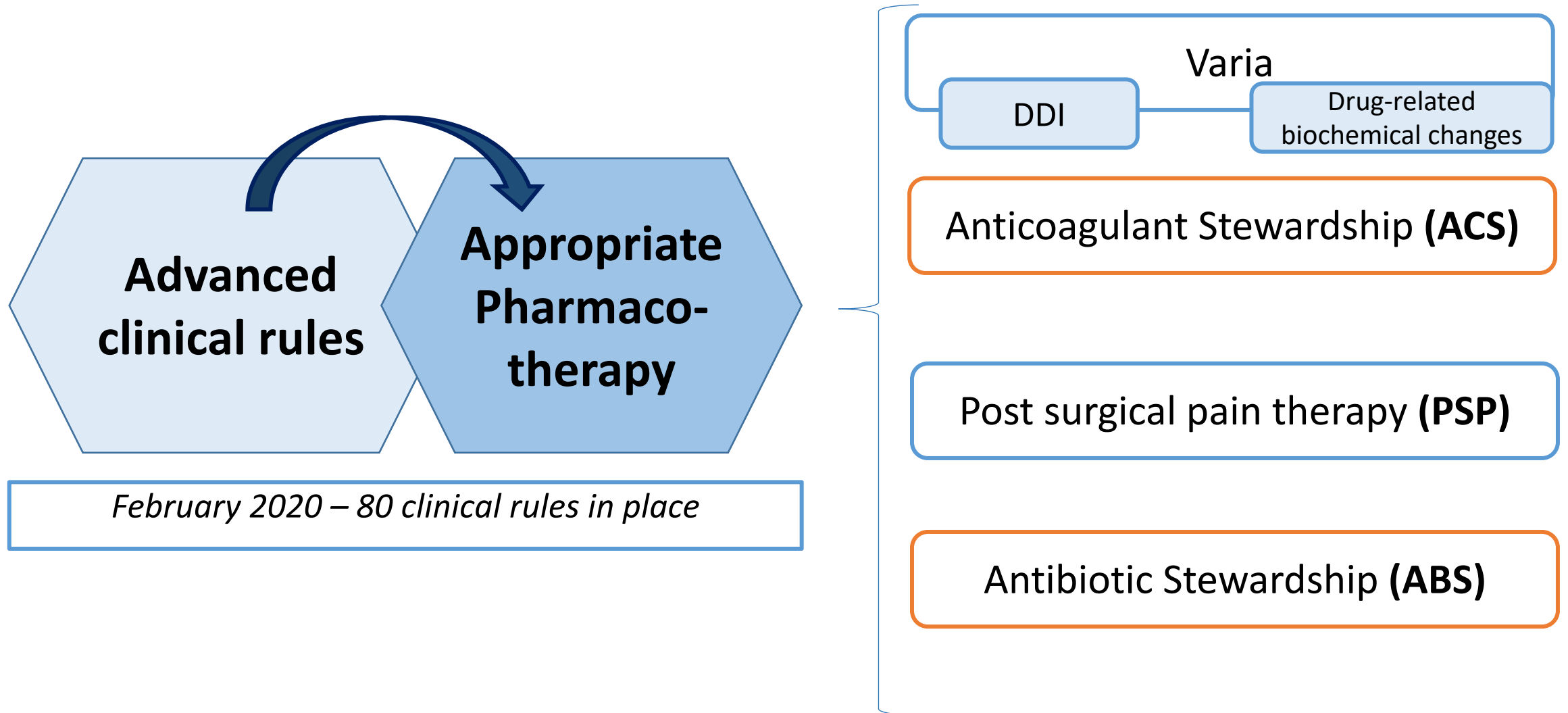
Example: screening for incorrect dosing of edoxaban

- Intervention: call + electronic alert



Afdeling	Template	Tekst	Contact type	Zender	Groep
GER	opvolgnota	ADVIES APOTHEEK: Op basis van de nierfunctie (CrCl < 50 ml/min) wordt de dosis van Lixiana (edoxaban) aangepast naar 30mg 1x per dag. Graag nazicht therapie.	hospitalisatie		apotheek

CMA: what's in a name?



Back-office clinical pharmacy (CMA): results thus far

December 2018 – November 2020

Pharmacotherapeutic bundle	Clinical rules implemented (n)	Actions provided by pharmacists (n)	Acceptance rate by physicians (%)
Antibiotic stewardship	43	2710	79.9%
Anticoagulant stewardship	13	2737	74.2%
Pain management	15	2944	77.7%
IV to oral switch therapy	2	1206	74.1%
Varia	9	2248	75.8%
Total	82	11845	77%

Advantages CMA

- CMA serves as a **bridge** between CDSS and (limited) bedside clinical pharmacy
- CMA contributes in an important way to **medication safety** in our hospital
 - Pharmacotherapeutic support is now provided **hospital-wide**: also to patients admitted on wards on which a bedside pharmacist is not available
 - As clinical rules are screening continuously and in **'near-time'**, changing biochemical parameters impacting pharmacotherapy are rapidly taken up

The basement vs. the bedside?

- Back-office clinical pharmacy services are **complementary** to bedside services
- Back-office clinical validation is an add-on but **can not replace** bedside services
 - **Acceptance rate is higher** for advice provided by bedside pharmacist
 - Bedside pharmacist has a more focused expertise
 - Orally provided advices have a higher impact than written ones
 - Type of clinical pharmacy services is **not identical**
 - Back-office: screening for potentially inappropriate prescriptions, ADEs
 - Front-office: multi-faceted approach, including
 - Med rec, medication review, discharge counseling, specific projects, discussion on complex cases
 - Experienced front-office clinical pharmacist provides **many spontaneous advices**, even when using explicit screening tools



From the bedside to the basement... and now back to the bedside?

Application of clinical rules to guide clinical pharmacists at te bedside

For example:

- clinical pharmacists counseling patients with chronic leukemia on DDIs –DHIs are available for 0.5 FTE at the consultation
- On average, 80 patients are daily visiting the consultation
- Clinical rule based screening can help and support the clinical pharmacist in prioritizing their work at the consultation

Plan for the near future:

- Development of clinical rule based bedside clinical pharmacy services
- Trauma ward, emergency dpt, pediatric ward
- Comparison of clinical rule based advices with historical spontaneous, randomly given ones



Take home messages

- Back-office clinical validation contributes to hospital-wide medication safety
- It is interesting to organise clinical pharmacy-services in a risk-based way
- Back-office clinical validation is complementary to front-office CP services