

Das Forum für ICT im Gesundheitswesen  
Le forum pour les TIC dans le système de santé



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SwissTech Convention  
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21.-22. September 2017

## Doing the right things and doing things right Relevant and Efficient Inpatient Drug Surveillance

Pieter J. Helmons, PharmD, PhD, MAS. Hospital pharmacist  
**St Jansdal Hospital, Harderwijk, The Netherlands**  
Email: [pj.helmons@stjansdal.nl](mailto:pj.helmons@stjansdal.nl) Phone: +31 (341) 435819

In cooperation with



## WHO AM I?

- Hospital Pharmacist
- Also licensed in California, USA
- With a PhD in applying IT to improve medication safety
- In a 340 bed midsized community hospital the Netherlands
- Which achieved EMRAM stage 6 in January 2017
- Which will achieve EMRAM stage 7 on November 28th



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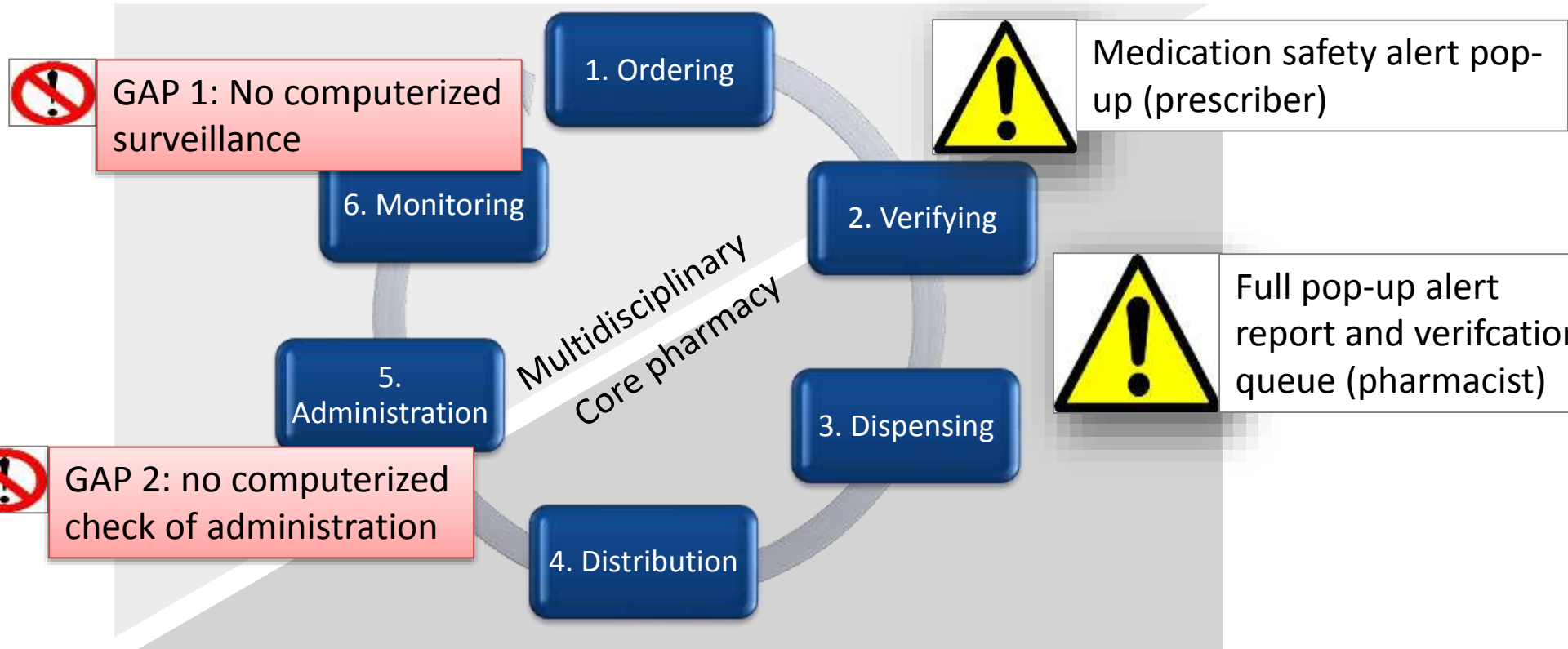
## WHO ARE YOU? BY SHOW OF HANDS....

- How many of you are prescribers / clinicians?
- How many of you are pharmacists?
- How many of you have experience with inpatient drug surveillance?
- Who is currently happy with their drug surveillance practices?



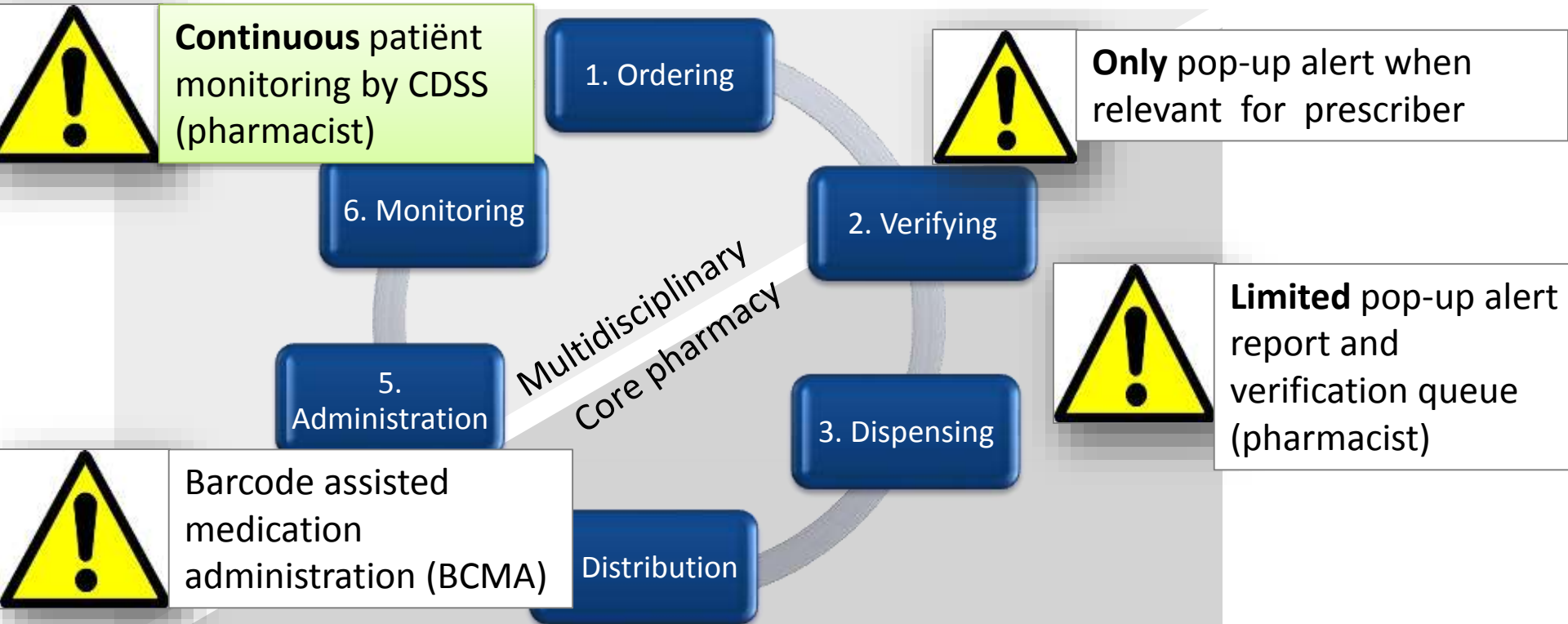
# DOING THE RIGHT THINGS

## CONVENTIONAL DRUG SURVEILLANCE PRACTICES



# DOING THE RIGHT THINGS

## CONTINUOUS PATIENT MONITORING AND BCMA AT ST JANSDAL



## DOING THINGS RIGHT

- The **right** information presented
- to the **right** professional
- in the **right** format (alert, order set etc)
- through the **right** channel (EMR, mobile device)
- at the **right** moment

## RIGHT ALERT, NOT THE RIGHT MOMENT...



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## TIMING OF ALERTING: IMMEDIATE OR DELAYED?

- Dosing alerts?
- Allergy alerts?
- Drug use in renal failure alerts?
- Duplicate therapy alerts?
- Drug-drug interaction (DDI) alerts?

**A** Immediate alerting

**B** Delayed alerting



# DRUG SURVEILLANCE: OUR APPROACH

## Define the problem

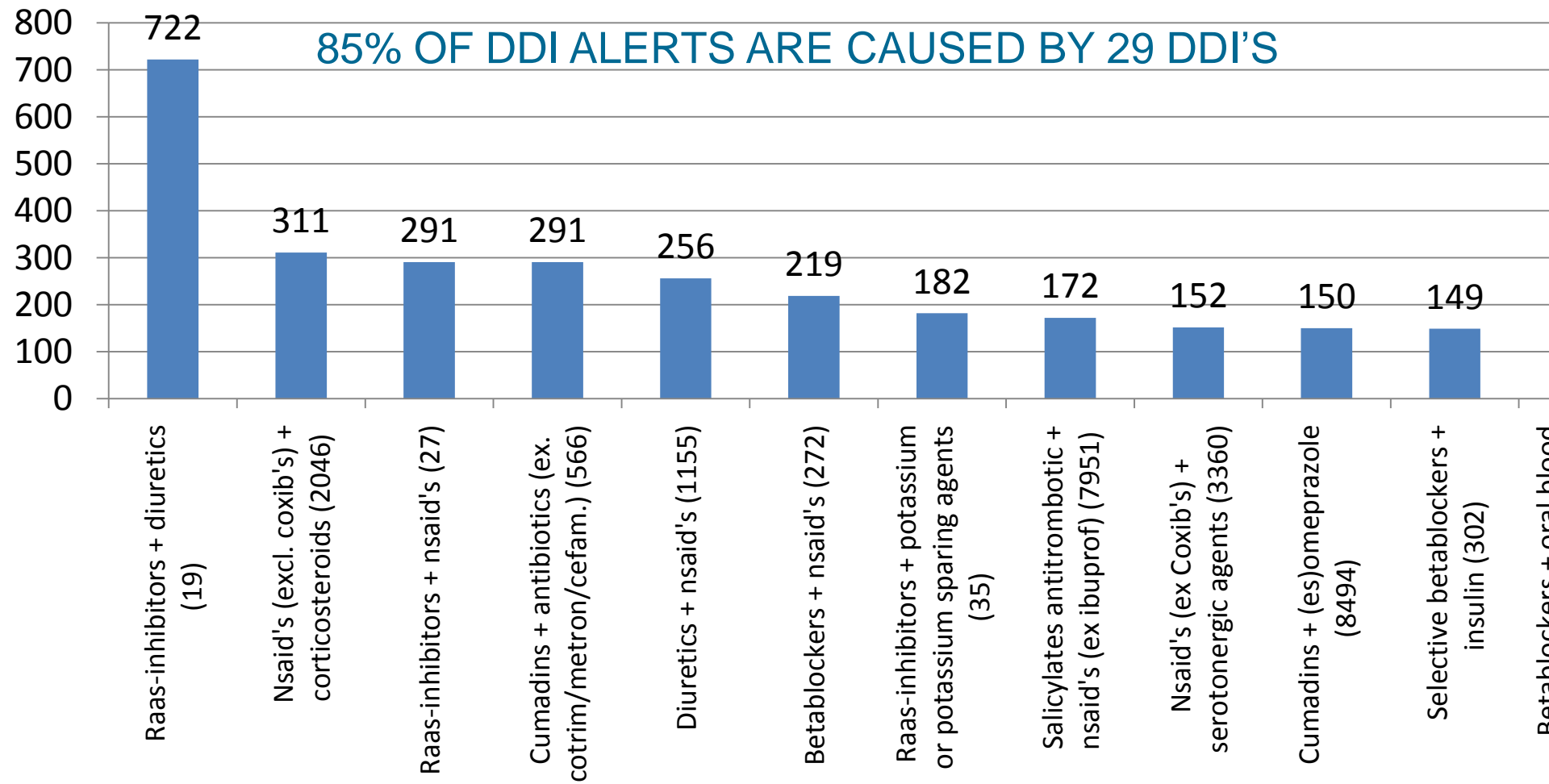
- Define the most frequently occurring interaction alerts (80/20 rule)
- Investigate the CPOE possibilities for prevention (e.g. ordersets, standardized orders)

## Discuss in expert panel

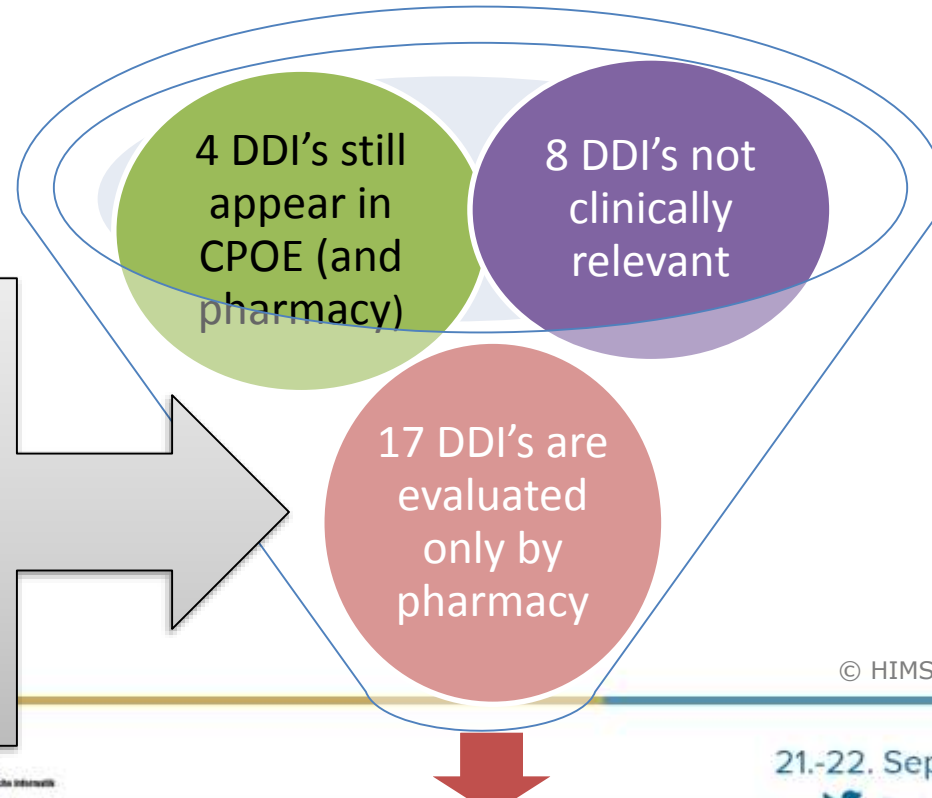
- Define relevance for inpatient setting
- Define the alert strategy: alert the clinician AND pharmacist, alert ONLY the pharmacist, don't alert at all.
- If relevant, define when an alert is appropriate.

## Build content for CDSS

- Build and validate the decision algorithm based on the national drug surveillance database (G-Standard)
- Move the algorithm to production



## 85% OF CPOE DDI ALERTS ARE CAUSED BY 29 DDI'S

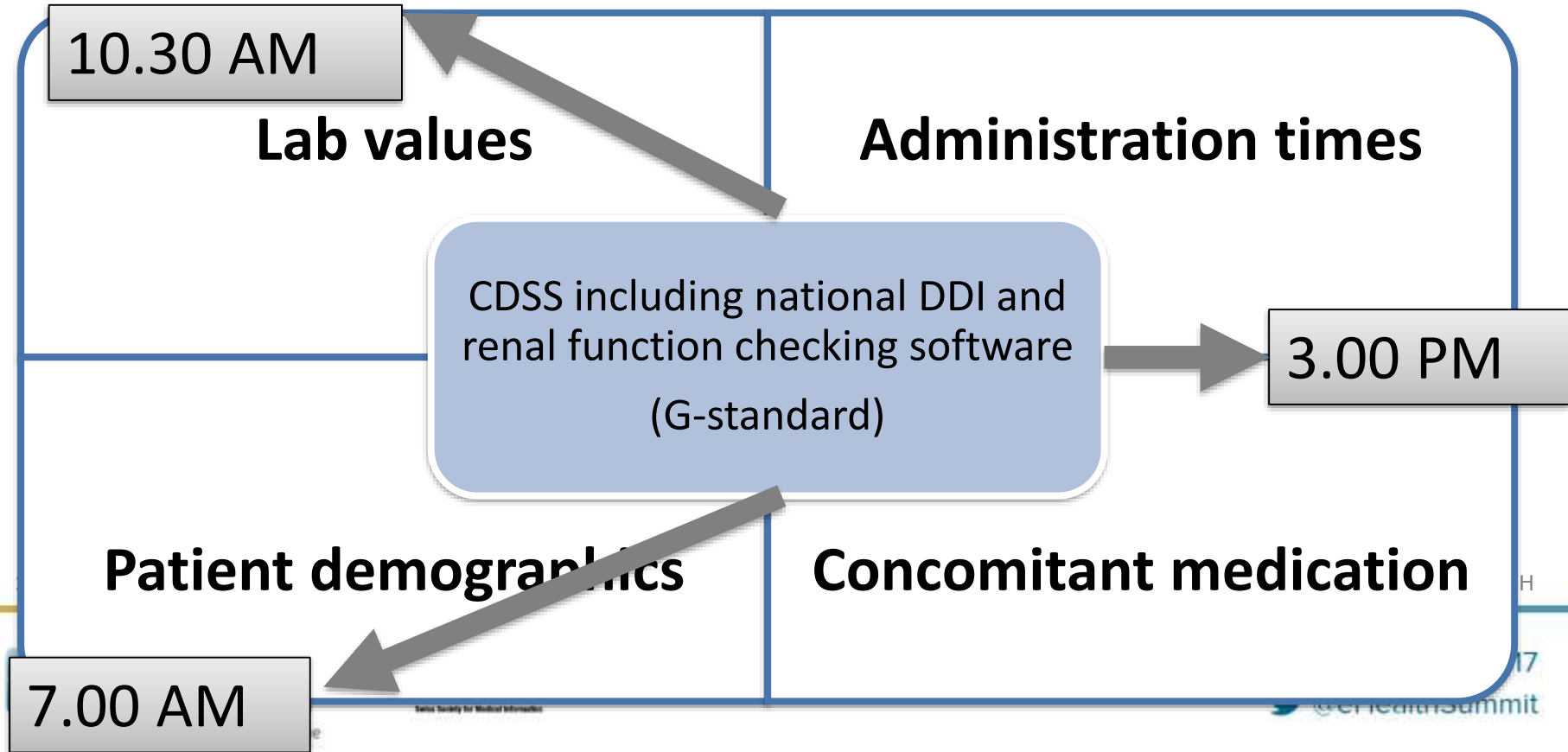


- 10 refined using lab data
- 5 refined using concomitant medication
- 3 refined using administration times
- 1 refined using dosing
- 2 not refined

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5% of DDI alerts remaining

# CONTINUOUS MEDICATION MONITORING

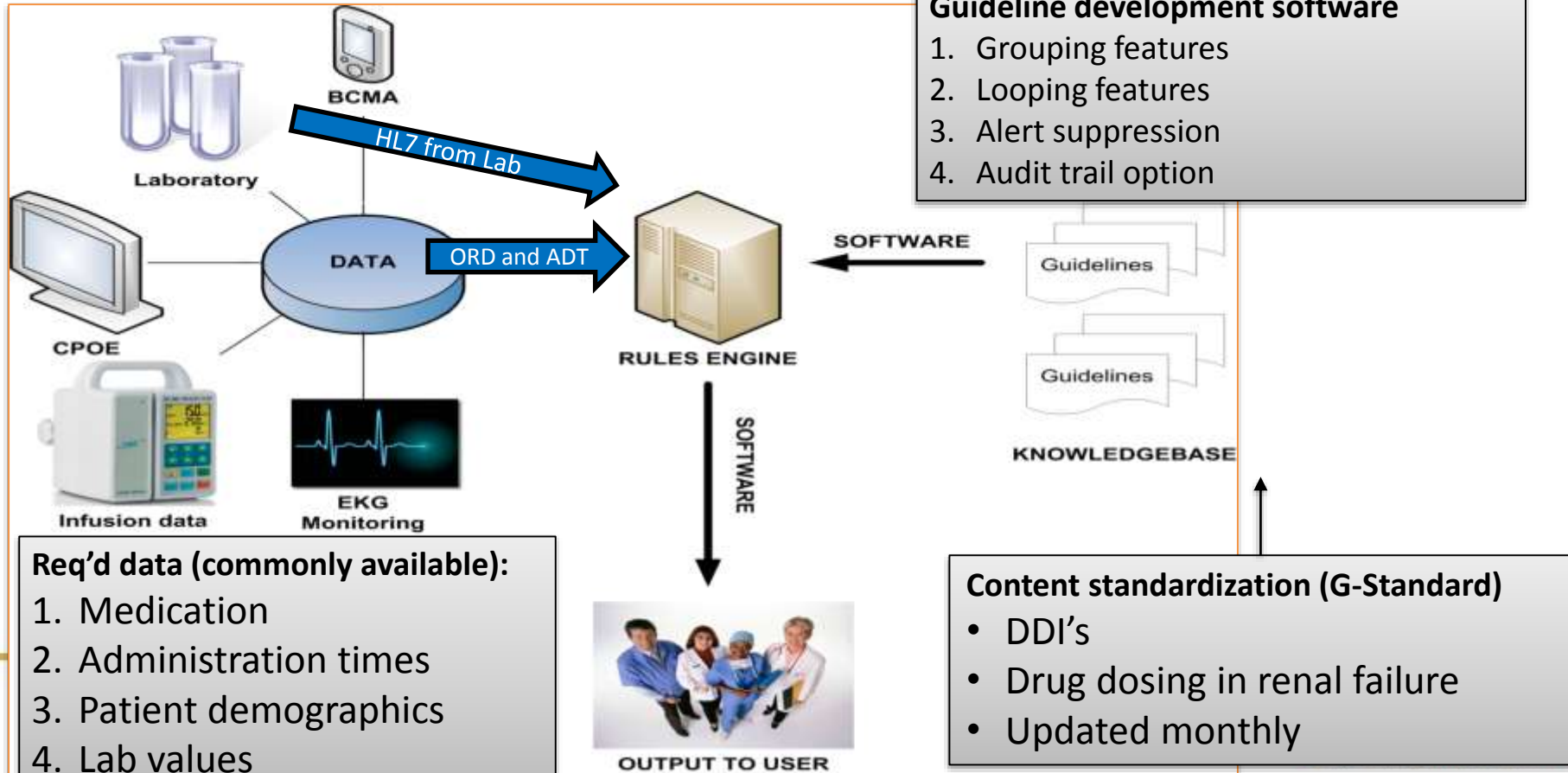


# BARRIERS TO ADOPTION OF CDSS

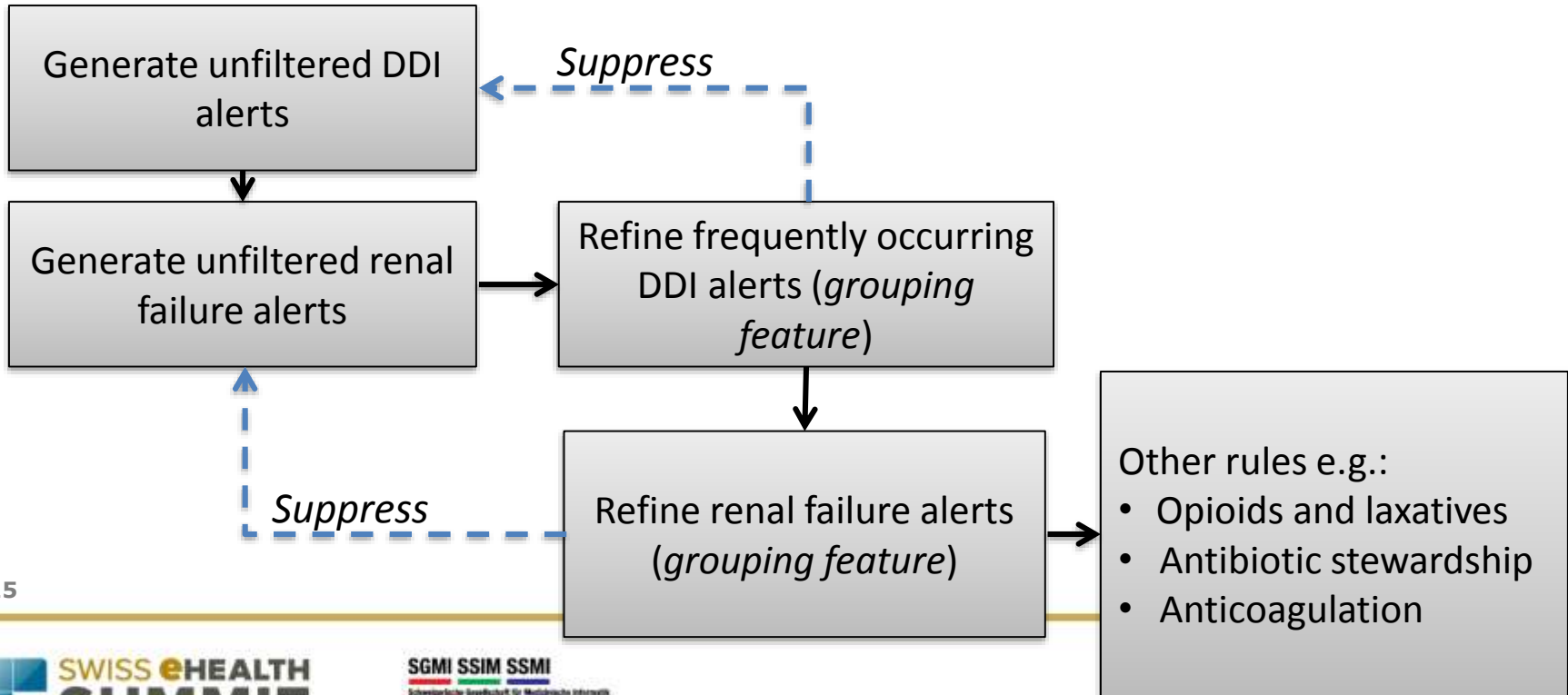
## Barriers

- |    |  |               |
|----|--|---------------|
| 1  | Limited CDSS capabilities of existing CPOE products                    |               |
| 2  | Limited usability of systems and CDSS modules                          | Functionality |
| 3  | Limited access to patient data needed to support a CDSS                |               |
| 4  | Limited access to best CDSS knowledge                                  |               |
| 5  | Local management of the CDSS knowledgebase                             |               |
| 6  | Lack of standards for data   | Content       |
| 7  | High cost and difficulty of implementation                             |               |
| 8  | High cost of use and maintenance                                       |               |
| 9  | Difficulty in recognizing and objectifying value                       | Costs         |
| 10 | Perception of increased liability if CDSS recommendations are rejected |               |

# 2017: A LOT LESS BARRIERS



# FROM BASIC TO ADVANCED DECISION SUPPORT



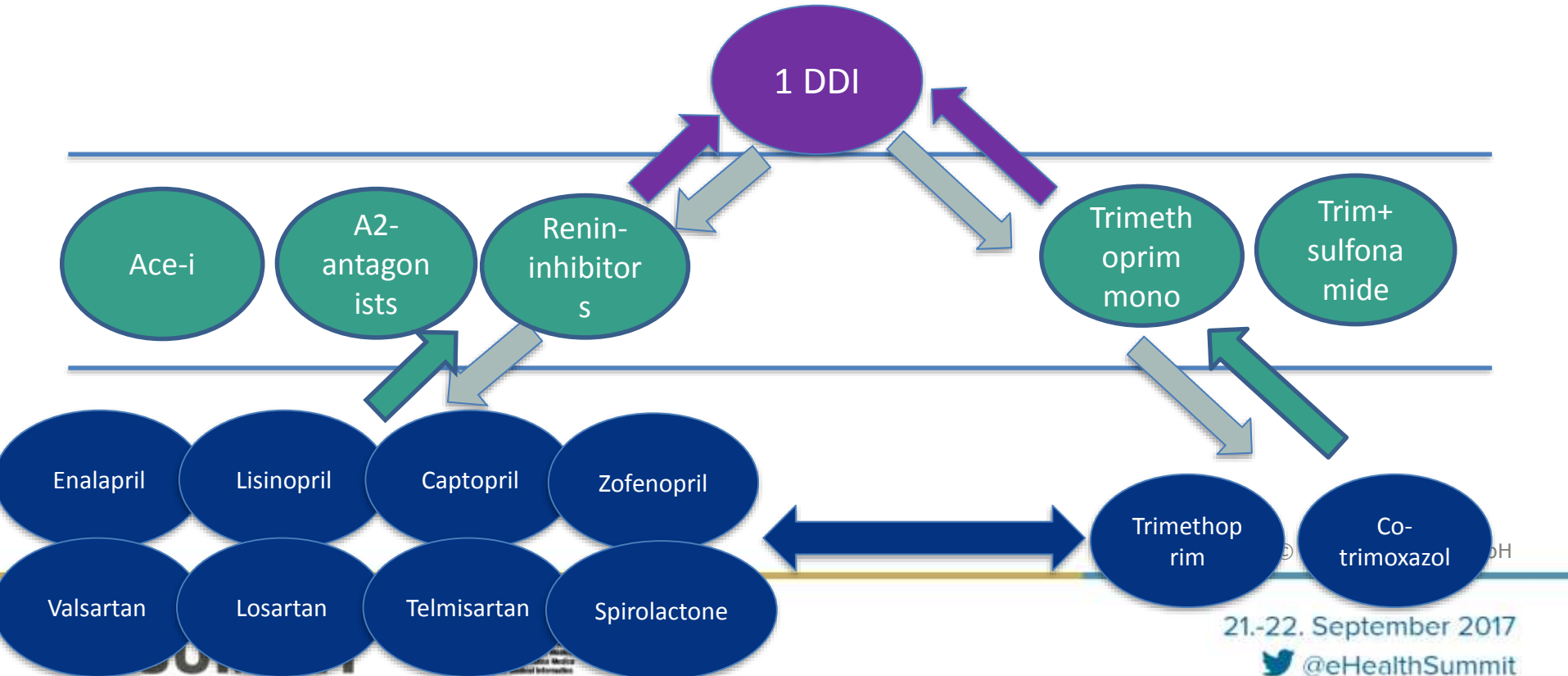
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# THE POWER OF GROUPING

## TRIMETHOPRIM + RAAS-INHIBITORS/SPIRONOLACTONE



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Group all hyperkalemia DDIs

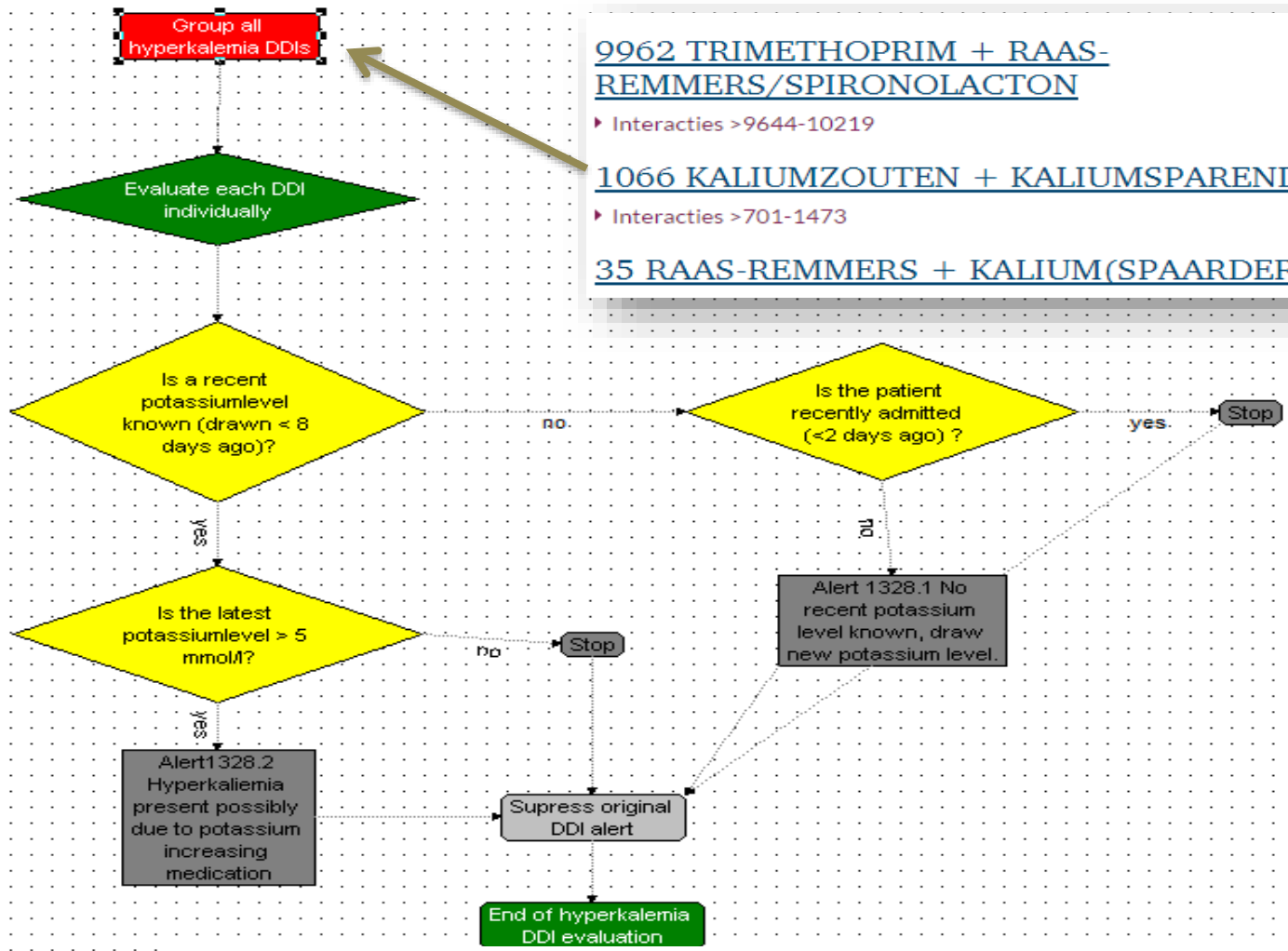
9962 TRIMETHOPRIM + RAAS-REMMERS/SPIRONOLACTON

► Interacties >9644-10219

1066 KALIUMZOUTEN + KALIUMSPARENDE DIURETICA

► Interacties >701-1473

35 RAAS-REMMERS + KALIUM(SPAARDERS)



# ALERT WITH LINKS TO G-STANDARD AND DATABASE CONTENT

**1328.2 Hyperkaliemie bij combinatie van kaliumverhogende middelen. (Generate Message, 01373)**

Structure Contents Audit

Message:

Normal **B** *I* U  $x^2$   $x_2$  [List Icons] [List Icons] [List Icons]

1328.2 [Gegroepeerde interacties](#) : [Naam \(Latest\)](#) ([Gegroepeerde interacties](#) : [Code \(Latest\)](#) )

**Probleem:** Kaliumgehalte > 5 mmol/l bij een combinatie van kaliumverhogende middelen. De laatste kalium spiegel is [kalium \(K\)](#): [Resultaat \(Latest\)](#) mmol/l gemeten op [kalium \(K\)](#): [Gemeten \(Latest\)](#)

**ACTIE:** **Meld arts dat deze combinatie de hyperkaliemie kan verklaren of verergeren en overleg of middelen kunnen worden gestopt.**

**Mogelijk symptomen zijn genoemd in de achtergrondtekst.**

**Medicatie**

[Gegroepeerde interacties](#) : [GPK1 code](#),[GPK1 etiketnaam](#),[GPK1 opgetreden](#),[GPK1 voorschrijver](#),[GPK1 dosering](#),[GPK1 doseringsfrequentie](#),[GPK1 zo nodig \(Latest\)](#)

[Gegroepeerde interacties](#) : [GPK2 code](#),[GPK2 etiketnaam](#),[GPK2 opgetreden](#),[GPK2 voorschrijver](#),[GPK2 dosering](#),[GPK2 doseringsfrequentie](#),[GPK2 zo nodig \(Latest\)](#)

**Lab**

[kalium \(K\)](#): [Term Name](#),[Resultaat](#),[Gemeten](#),[Gemeten \(Latest 5\)](#)

Explanation:

Normal **B** *I* U  $x^2$   $x_2$  [List Icons] [List Icons] [List Icons]

**Ziekenhuistekst:**

[Gegroepeerde interacties](#) : [HospitalText \(Latest\)](#)

**Achtergrondtekst:**

[Gegroepeerde interacties](#) : [backgroundtext \(Latest\)](#)

OK Cancel

Clinical rule	DDI's (#)	Additional variables used in CDSS	Conven- tional alerts	CDSS assisted alerts	Reduc- tion (%)
<b>Gastric protection</b>	6	Concomitant medication (PPI, H2 blockers), labs (magnesium)	35	4	89
<b>Hyperkalemia monitoring</b>	3	Patient parameters (admin date), Labs (potassium)	19	2	89
<b>Hypokalemia monitoring</b>	3	Patient parameters (admin date), Labs (potassium)	1	0	100
<b>Hyponatremia monitoring</b>	3	Patient parameters (admin date), Labs (sodium)	2	0	100
<b>Time dependent DDI's</b>	25	Admin times, Labs (hemoglobin)	10	4	60
<b>Coumadin DDI's, INR ↑</b>	13	Medication order data (start date), Labs (INR)	30	5	83
<b>Coumadin DDI's, INR ↓</b>	7	Medication order data (start date), Labs (INR)	11	2	82
<b>TOTAAL</b>	<b>60</b>		<b>108</b>	<b>17</b>	<b>86%</b>

## AND WHAT DID IT BRING US (2015)?

- 2204 inpatients were monitored by the CDSS for 5004 potential problems.
- In 1088 patients (49%) monitoring resulted in a change in their medication profile
- In 269 patients (12%) an advice was given to the doctor for further monitoring/labtests
- Decreased DDI alerts at the point of prescribing by 80% and within pharmacy by 55%
- Reduced time of DDI checking by pharmacy by > 50% allowing budget neutral expansion of other drug surveillance activities
- **Most of all:** clinician (prescriber, pharmacist AND technician) satisfaction

## KEY TAKEAWAYS

### 1. Analyze your alert “landscape”

- Determine your 80/20 rule
- Determine relevance: turn off irrelevant alerts
- Determine the most relevant time of alerting

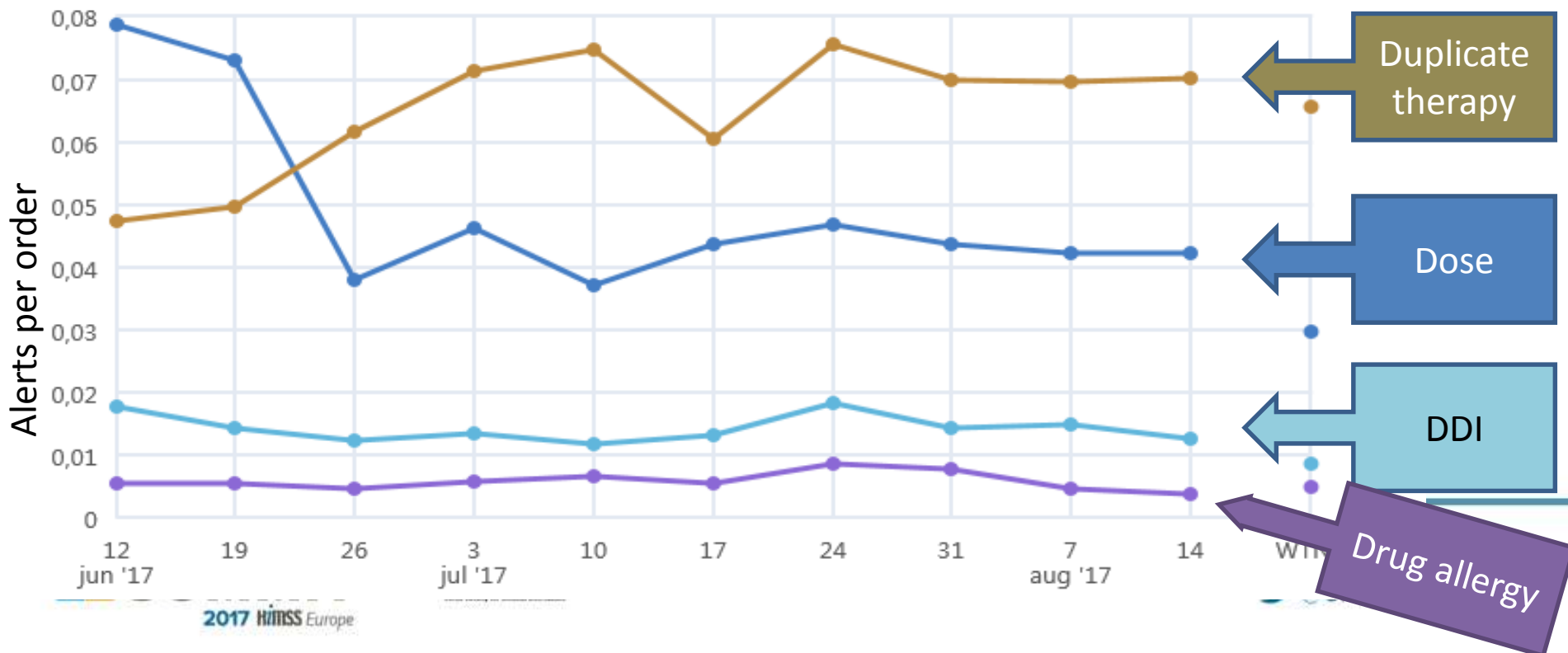
### 2. CDSS capabilities are key to success

- Grouping functionality
- Integration of high quality knowledgebases (see bibliography)
- User friendly interface

### 3. Build smart/low maintenance rules

- Only limited additional data are required for a huge effect
- Build rules based on desired action
- Create generic alerts with links to standardized knowledgebase and EMR data

## OUR ALERTING DASHBOARD: VERY LOW ALERT/ORDER RATIO



MANY THANKS!

