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# Drug related problems

## How to detect patients at risk

**Markus Lampert**, MSc(Pharm), PhD, ClinPharmFPH

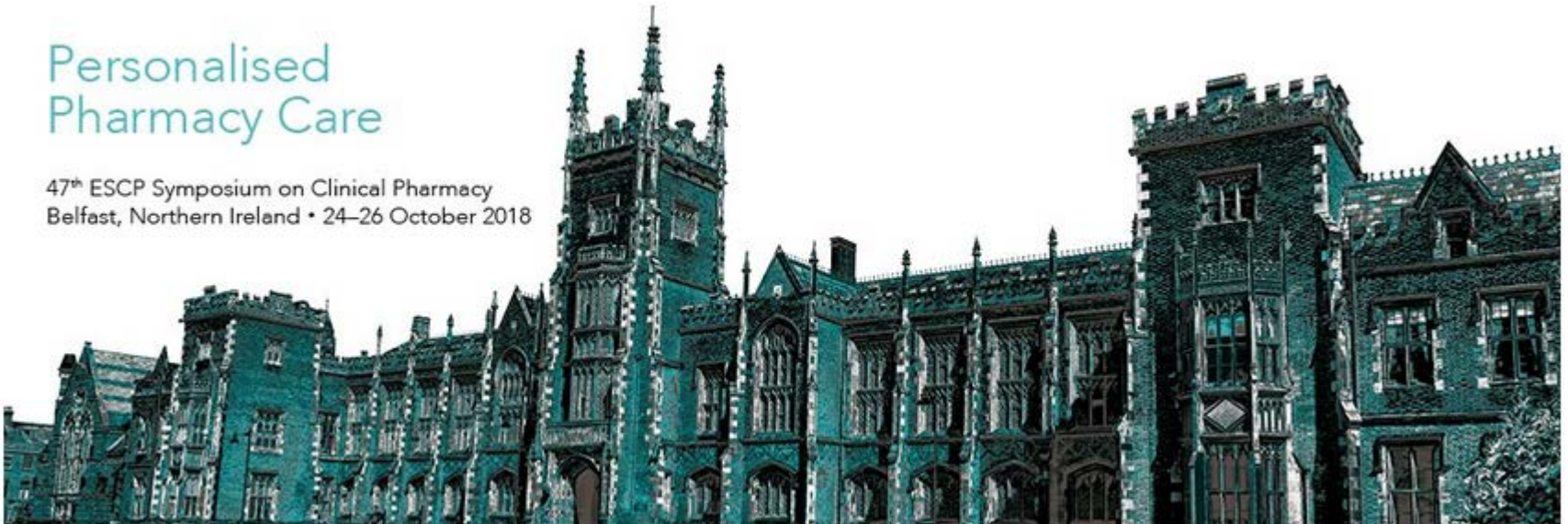
**Fabienne Boeni**, MSc(Pharm), PhD, ClinPharmFPH



European Society of Clinical Pharmacy

Personalised  
Pharmacy Care

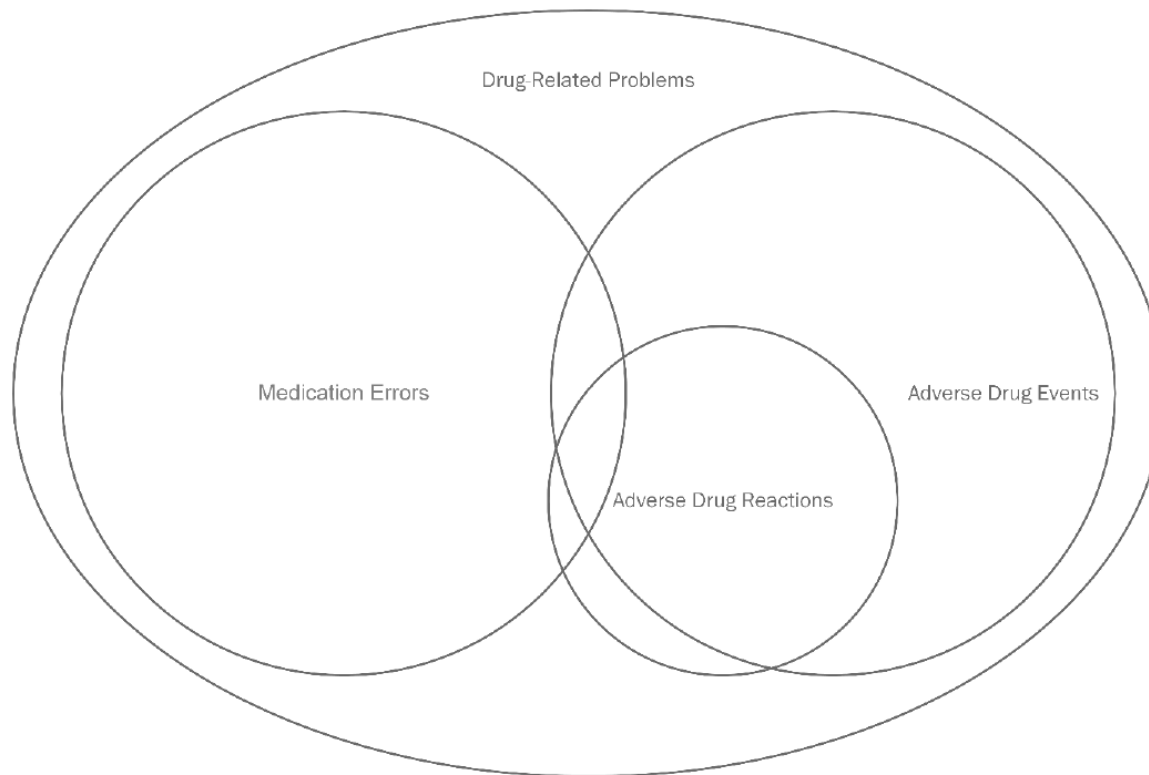
47<sup>th</sup> ESCP Symposium on Clinical Pharmacy  
Belfast, Northern Ireland • 24–26 October 2018



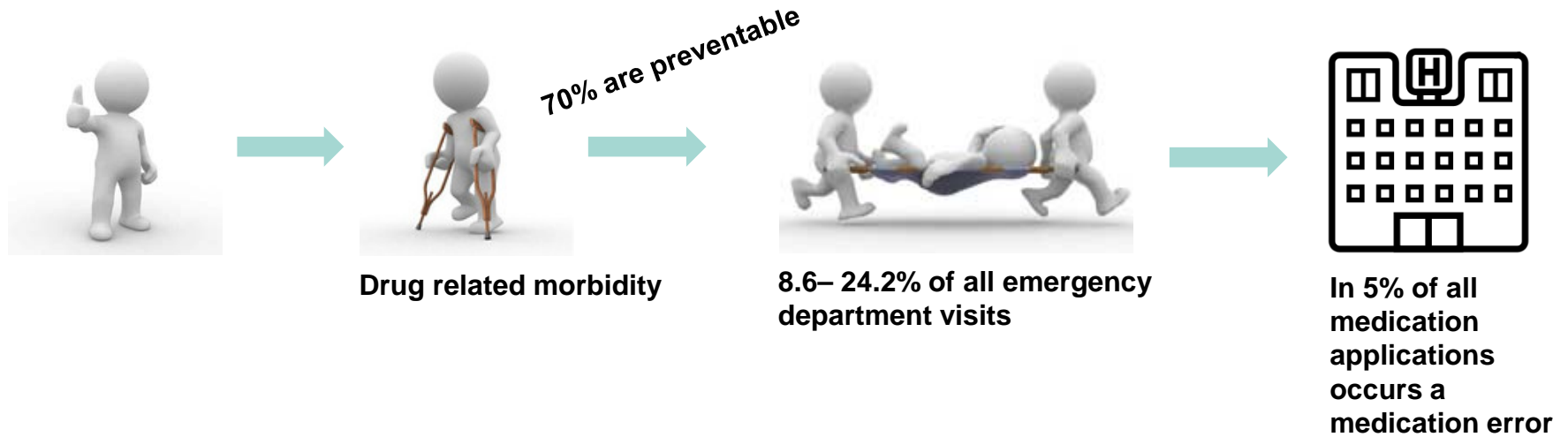
# What are drug related problems.

A drug-related problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes.

*Pharmaceutical Care Network Europe (PCNE); [www.pcne.org](http://www.pcne.org)*



# Drug related problems are a real problem.

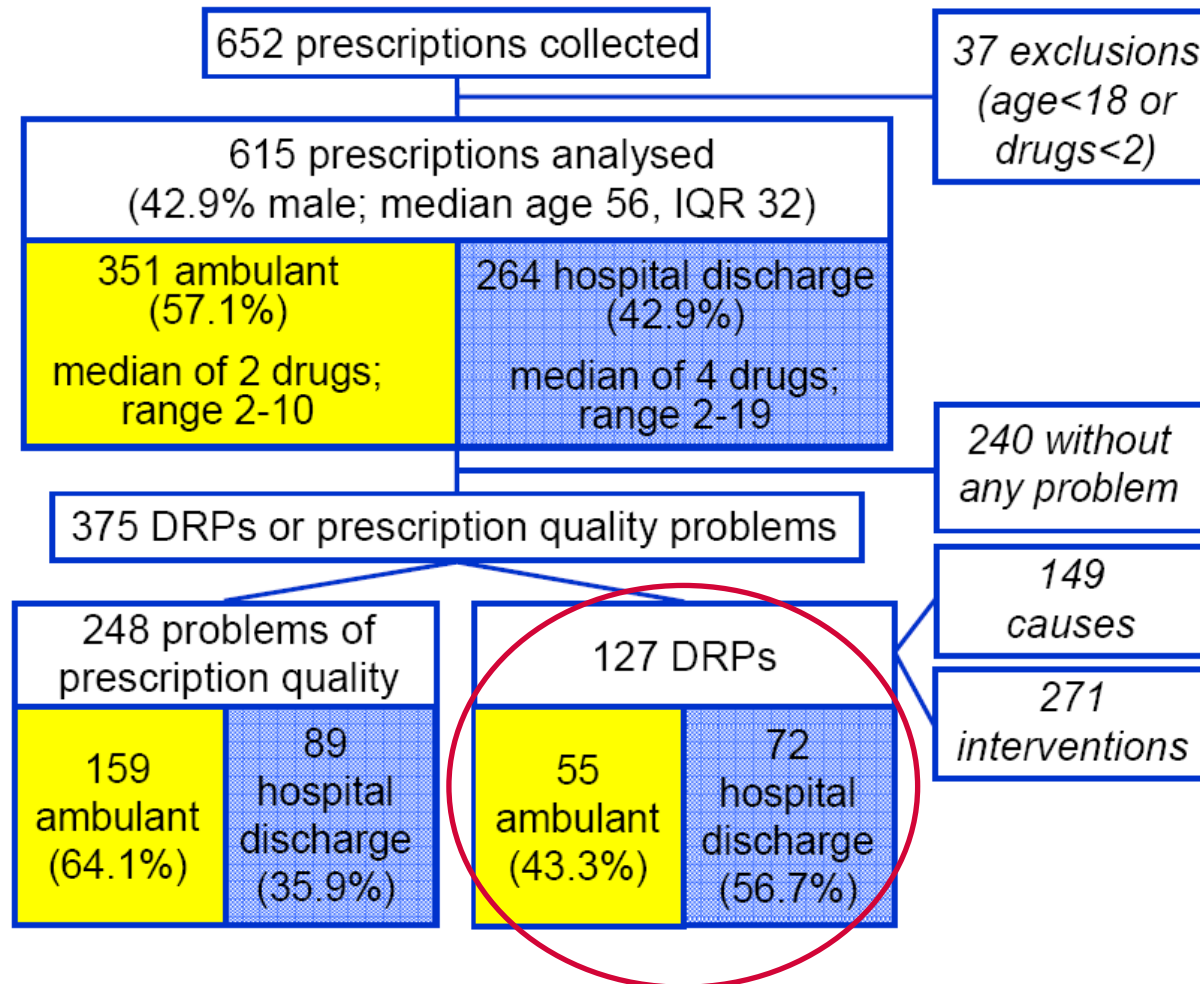


## Comparison

**275'689** deaths per year (US, 2016) ↔ **37'461** road fatalities (US, 2016)


Estimated annual cost of **\$528.4 billion** ↔ Heart disease & stroke = **\$230 billion**;  
diabetes = **\$197 billion**

# There are DRPs in community too.




# Optimising medication therapy is resource intensive.

Assessments of pharmacotherapy need to be:

- Multifaceted
  - Complete
  - Global
- 
- comprehensive medication management services

This requires:

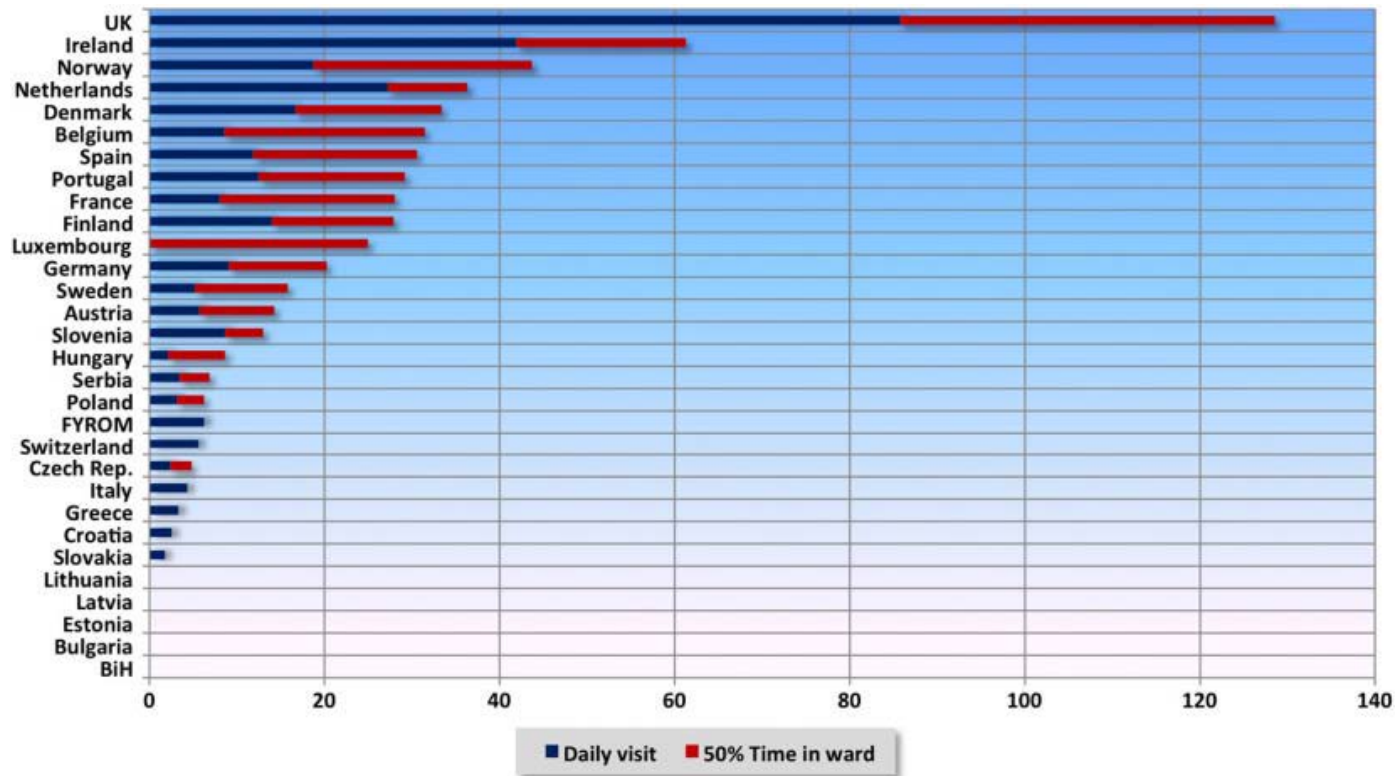
- Physicians
  - Clinical Pharmacists
  - Nurse practitioners
  - ...
- 
- collaborative care teams

# Often there are too many patients for one pharmacist.





# Clinical pharmacy practice in European hospitals.



**Patients need to be stratified by their risk to experience DRPs in order to allocate available resources and to offer targeted services**

# Four patients – are they at risk for DRPs?



**Mrs. A.B.**, 63 years old

- Lives with her husband
- High school
- Cleaning woman
- Diagnosis: 3
- Medications: 4



**Mrs. B.C.**, 55 years old

- Lives with her husband, frequent travels
- University of applied science
- Diplomatic service
- Diagnosis: 6
- Medications: 8



**Mr. C.D.**, 90 years old

- Lives alone in a house
- Apprenticeship
- Retired
- Diagnosis: 11
- Medications: 7



**Mr. D.E.**, 52 years old

- Lives alone in a flat
- Apprenticeship
- Unemployed
- Diagnosis: 7
- Medications: 12



# What are we doing today?

## Aim

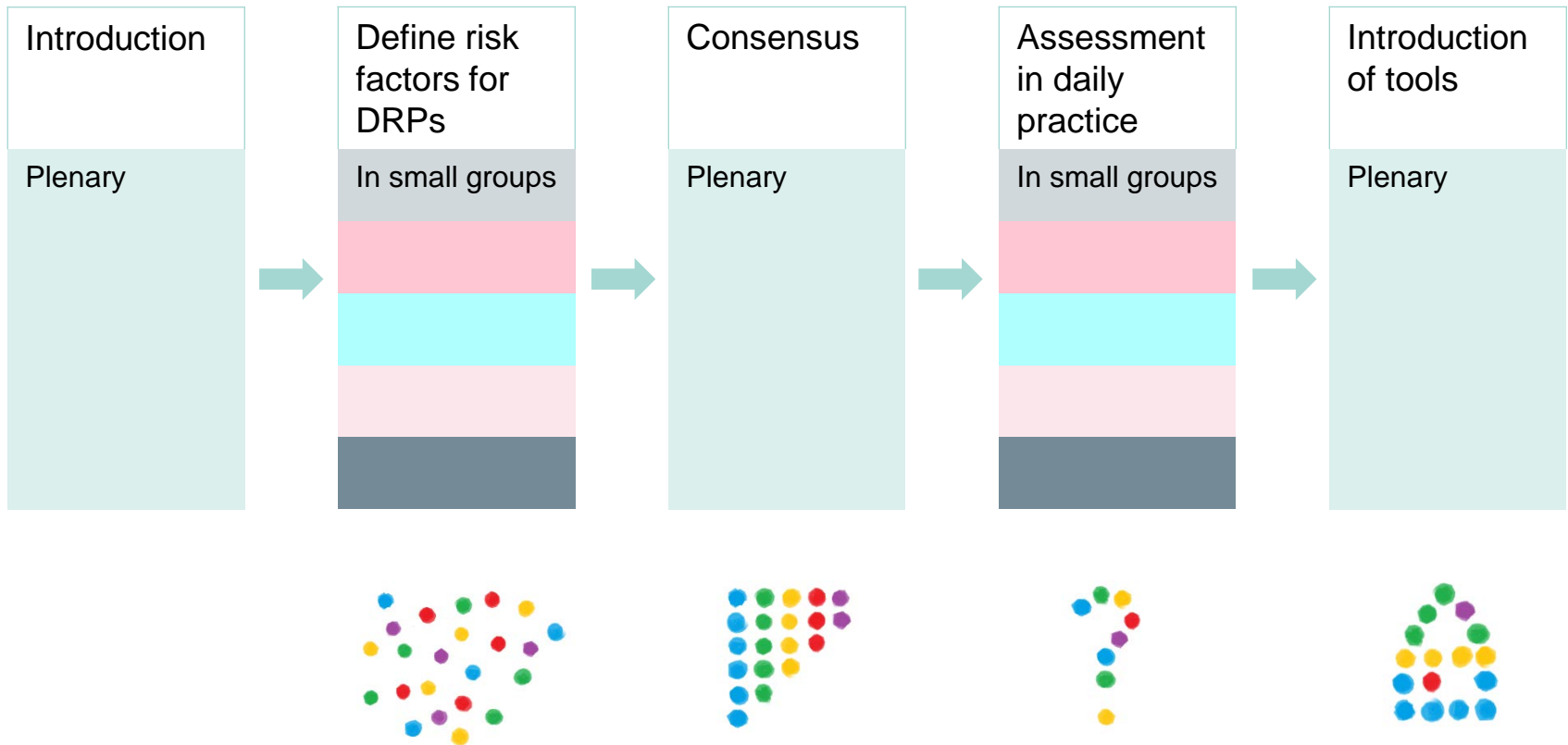
The aim of this workshop is to show how patients at risk for DRPs could be identified effectively and efficiently.

## Learning Objectives

The participants will learn about relevant risk factors and how to identify and assess them. Different approaches will be discussed and selected existing risk assessment tools will be demonstrated.



# Agenda.



# Methodological input:

## Why use ... Nominal Group Technique?

Beginning with a specific and clear question, the participants can identify issues and prioritise them. The same question or topic can be used with different groups of people, for example staff, patients or carers, and comparisons made between the issues and priorities. One session usually lasts about three hours.

The Nominal Group Technique has five main stages:

- Idea – for 5–10 minutes delegates write down ideas based on the question/s posed.
- ‘Round Robin’ stage – each delegate reads out one of their ideas with their best one first and these are jotted down onto a larger piece of paper, blackboard or flipchart.
- Clarification – at this stage each idea is discussed more widely and clarified; duplicate ideas are brought together and individual ideas are numbered.
- Voting – from the ideas which are numbered, delegates prioritise them based on an agreed voting system.
- Action – the group discusses their plan of action, based on the outcome of the vote, with the intent of reaching agreement on how they will deal with the original question.

[http://www.scottishhealthcouncil.org/patient\\_\\_public\\_participation/participation\\_toolkit](http://www.scottishhealthcouncil.org/patient__public_participation/participation_toolkit)

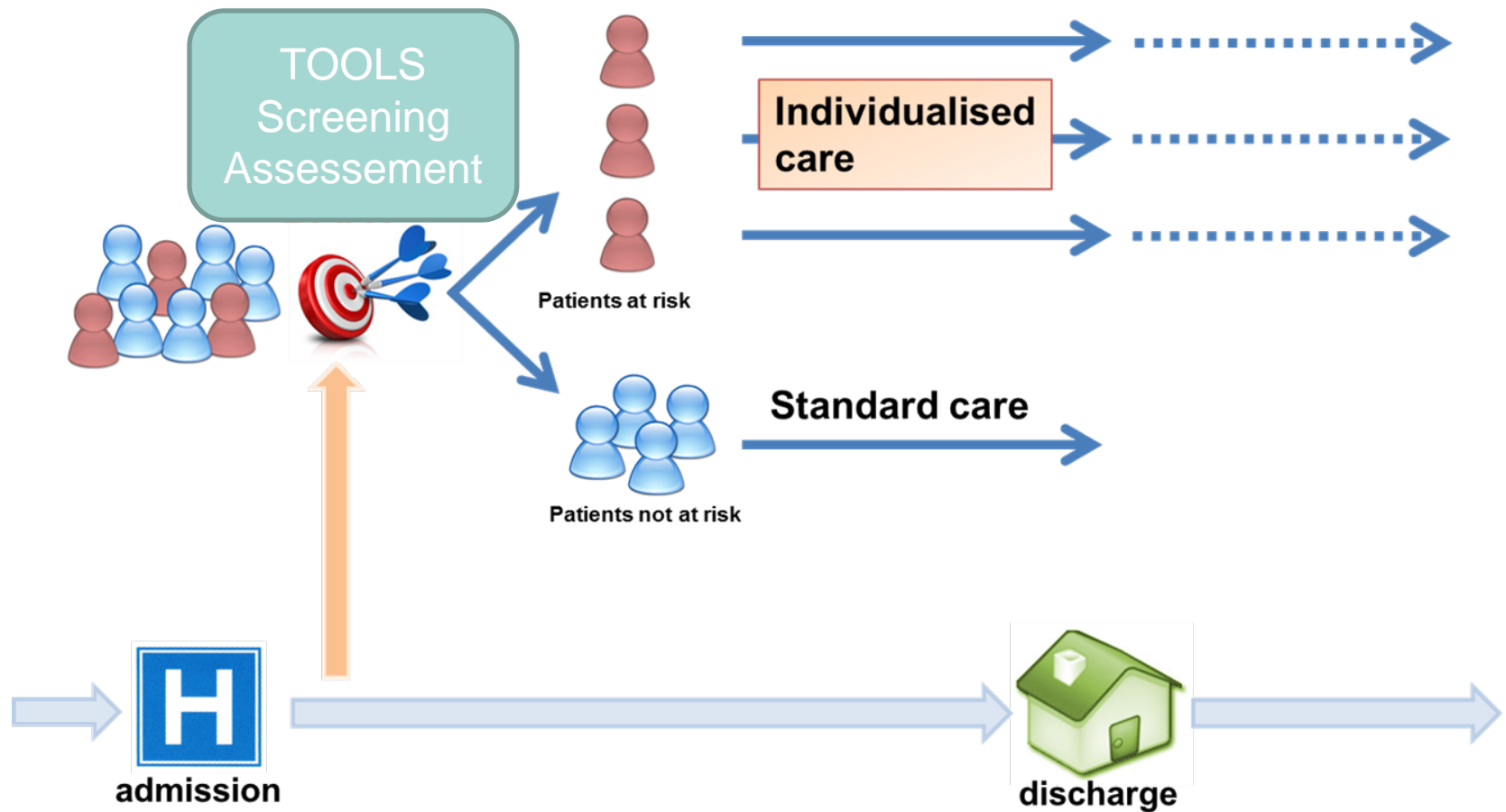


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# Group Exercise I



# Risk stratification of patients



# Define individual risk factors for DRPs

Write down risk factors:

- use one card per factor
- do not discuss or weigh

There is no right or wrong!  
Just brainstorm!

You have **20 minutes**.







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# Consensus





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# Group Exercise II



# Assessment in daily practice?

## **Step 1:**

Choose the risk factors you want to use for risk stratification in daily practice.

*Objective of the stratification:* Which patient should get intensified pharmaceutical care by you?

## **Step 2:**

For each risk factor chosen define

- what information you need to characterise the risk factor
- the source of information
- who will collect/assess the information
- the pharmaceutical care issue addressed thereby

(e.g. Risk factor: Renal insufficiency – information needed: eGFR – source: lab results in electronic patient record – who: clinical pharmacist – care issue: dose adaption to renal function/avoid overdosing)

## **Step 3:**

Give a rough outline about how you would perform this assessment in a daily practice setting. Think of your resources!

(e.g. To create a form in which all relevant parameters will be filled by the clinical pharmacist)

## Risk assessment

Risk factor	Information needed	Source of information	Information collected by	Pharmaceutical Care Issue
Renal insufficiency	eGFR	Lab result in electronic patient record	Clinical pharmacist	Dose adaption to renal function/avoid overdosing

# Tools – The Brighton Adverse Reaction Risk Model (BADRI)

The Brighton Adverse Drug Reactions Risk Model (BADRI) is a tool to predict the occurrence of ADRs and is aimed at a population of patients older than 85 years of age.

Variables	<ul style="list-style-type: none"><li>▪ Hyperlipidaemia</li><li>▪ Number of drugs (&gt; 8)</li><li>▪ Hospital length of stay (<math>\geq 12</math> days)</li><li>▪ Use of anti-diabetics</li><li>▪ High white cell count on admission</li></ul>
Population	Inpatients > 85 years of age
Validation Status	Validated (ADR occurrence)

Comment: Out-performing all other models, this score has been described as fairly discriminative and sufficiently validated by the systematic review of Falconer and colleagues.

Tangiisuran B, Scutt G, Stevenson J, et al. Development and validation of a risk model for predicting adverse drug reactions in older people during hospital stay: Brighton Adverse Drug Reactions Risk (BADRI) model. PLoS ONE 2014;9(10):e111254. doi: 10.1371/journal.pone.0111254  
Falconer N, Barras M, Cottrell N. Systematic review of predictive risk models for adverse drug events in hospitalised patients. British journal of clinical pharmacology 2018 doi: 10.1111/bcp.13514

# Tools – The Assessment of Risk Tool

An application that monitors clinical data on specified medication and other risk factors. The risk factors are grouped into five categories, each triggering a weighted score.

Variables	The application is triggered by a total of 38 risk factors on patient traits, recent hospitalisation, chronic conditions, certain drugs, and exceeding laboratory values
Population	Inpatients with mean age $66 \pm 19$ years (SD)
Validation Status	Validated (unintentional discrepancies in MedRec)

Comment: Some of the risk factors need clinical pharmacy processes in order to be evaluated. The category of risk factors on laboratory values was excluded from the validation study due to technical difficulties

Falconer N, Nand S, Liow D, et al. Development of an electronic patient prioritization tool for clinical pharmacist interventions. Am J Health Syst Pharm 2014;71(4):311-20. doi: 10.2146/ajhp130247

Falconer N, Liow D, Zeng I, et al. Validation of the assessment of risk tool: patient prioritisation technology for clinical pharmacist interventions. Eur J Hosp Pharm Sci Pract 2017;24:320-26



# Tools – IHI Global Trigger Tool

A manual, retrospective review of closed inpatient hospital records using “triggers” (or clues) to identify possible adverse events.

Variables	Six groupings of triggers. Four for particular units; ‘Cares’ and ‘Medication’ for anywhere in the hospital. <ul style="list-style-type: none"><li>▪ Cares</li><li>▪ Medication</li><li>▪ Surgical</li><li>▪ Intensive Care</li><li>▪ Perinatal</li><li>▪ Emergency Department</li></ul>
Population	Inpatients aged 18 years or older, excluding psychiatric and rehabilitation patients
Validation Status	Validated (identification of ADEs)

Comment: Retrospective assessment, not designed to identify preventable ADEs.

Griffin FA, Resar RK. IHI Global Trigger Tool for Measuring Adverse Events (Second Edition). IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2009. (available after registration on [www.IHI.org](http://www.IHI.org))

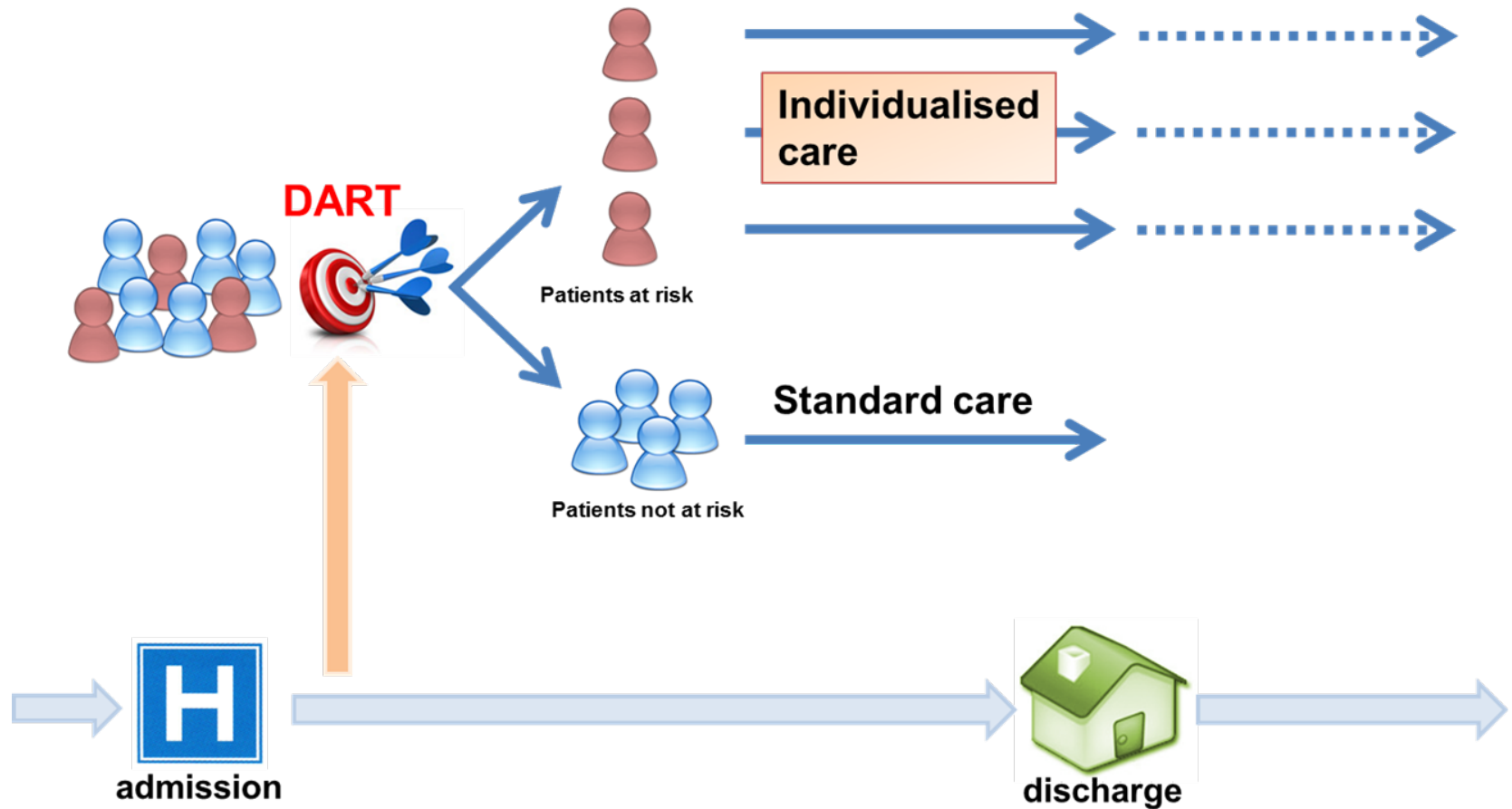
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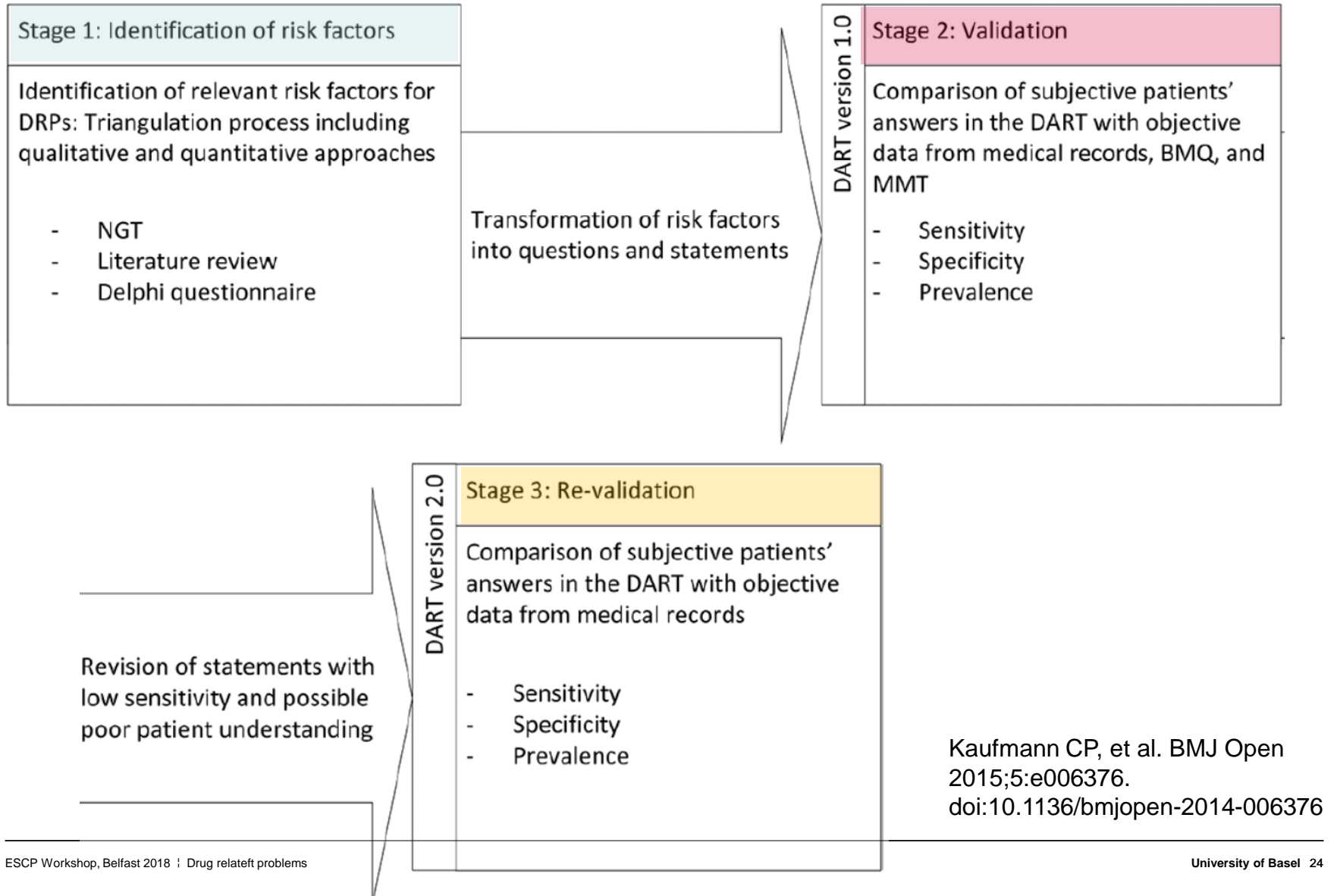
*Pharmaceutical Care Network Europe (PCNE); [www.pcne.org](http://www.pcne.org)*



# Developing a screening instrument: The **D**rug **A**ssociated **R**isk **T**ool



# Developing a screening instrument: The **D**rug **A**ssociated **R**isk **T**ool



# Defining risk factors (RF) for ADEs: a mixed methods approach

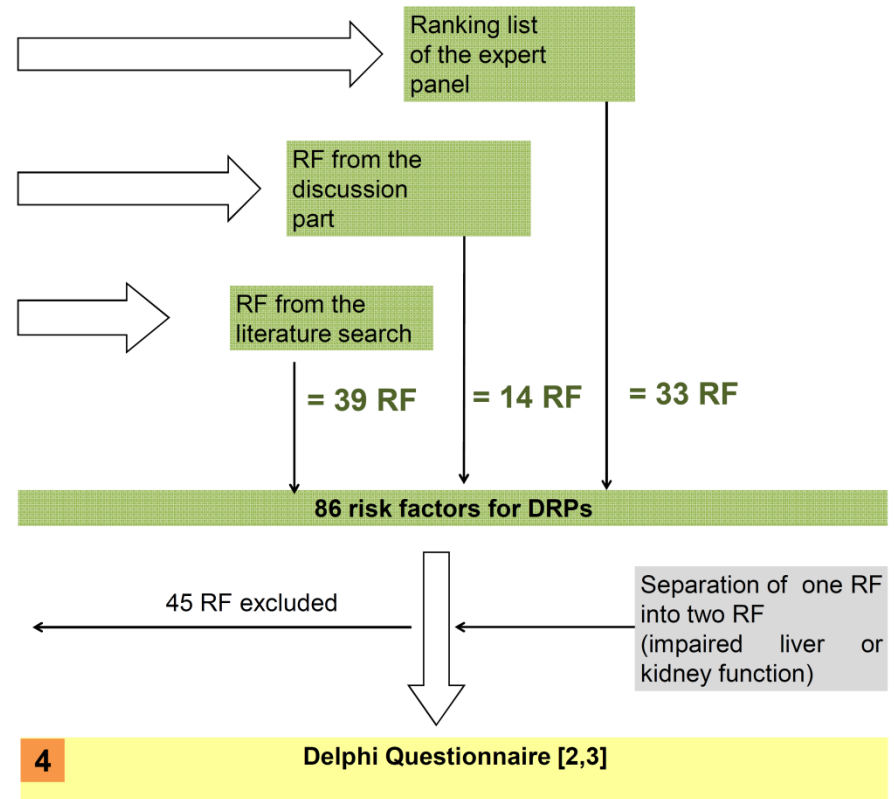
**1 Expert panel** (Nominal Group Technique [2,3]): During a structured discussion, all participants had to write down as many risk factors as possible from their professional experience and rank them by their importance.

**2 Expert panel discussion parts:** Qualitative analysis of the structured, audiotaped discussion.

**3 Literature search** in PubMed and Embase. Titles and abstracts were screened for the terms “risk factors”, “predictors”, or “high risk” combined with “drug-related problems” or sub terms of its definition.

## Exclusion criteria

- RF mentioned in only 1 publication
- lowermost quartile of the ranking list
- unpredictable event or circumstance
- interventions to improve seamless care
- seamless care issues
- synonyms



# Identified Risk Factors

**Table 2** Final ranking list of the 27 risk factors contributing to the occurrence of DRPs rated by the expert panel as 'important' (Likert scale: 4) or 'rather important' (Likert scale: 3)

Risk factor	Delphi		NGT Ranking list	Qualitative analysis	Literature
	Median	IQR			
Dementia, cognitive situation, low IQ, confused patient	4	4.00–4.00	Yes		10, 17, 18, 19, 20
Polypharmacy (number of drugs >5)	4	4.00–4.00	Yes	Yes	10, 17, 18, 21, 22, 5
Antiepileptics	4	4.00–4.00		Yes	23, 24, 20, 25
Anticoagulants	4	4.00–4.00		Yes	10, 21, 23, 26, 5
Combinations of NSAID and oral anticoagulants	4	4.00–4.00		Yes	20
Insulin	4	4.00–4.00	Yes		10, 23, 24
Missing information, half-knowledge of the patient, the patient does not understand the goal of the therapy	4	4.00–3.25	Yes		11
Medication with a narrow therapeutic window	4	4.00–3.25	Yes	Yes	5
Non-adherence	4	4.00–3.00	Yes		10
Polymorbidity	3.5	4.00–3.00	Yes	Yes	10, 22
Digoxin	3	4.00–3.00			24, 20, 27
Renal impairment (eGFR <30 mL/min)	3	4.00–3.00	Yes		10, 22, 20
NSAIDs	3	4.00–3.00		Yes	5, 10, 21, 23, 24, 25
Experience of ADR	3	3.75–3.00	Yes	Yes	22
Medication that is difficult to handle	3	3.75–3.00	Yes		
Language issues (ie, non-native speakers)	3	3.00–3.00	Yes	Yes	
Diuretics	3	3.00–3.00		Yes	5, 10, 19, 23, 24, 26, 25
Tricyclic antidepressants	3	3.00–3.00			21, 20
Hepatic impairment	3	3.00–3.00	Yes		22, 20
Self-medication with non-prescribed medicines	3	3.00–3.00	Yes	Yes	
Impaired manual skills (causing handling difficulties)	3	3.00–3.00	Yes		
Visual impairment	3	3.00–3.00	Yes	Yes	17
Anticholinergic drugs	3	3.00–3.00			28
Benzodiazepines	3	3.00–3.00			21, 20, 28, 25, 29
Opiates/opioids	3	3.00–3.00			10, 23, 26, 20, 25
Corticosteroids	3	3.00–2.00			10, 23, 24
Oral antidiabetics	3	3.00–2.00			10, 23, 24

Kaufmann CP, et al. BMJ Open 2015;5:e006376. doi:10.1136/bmjopen-2014-006376



# DART

## (Drug Associated Risk Tool)

The patient suffers from renal impairment  
( $<30$  ml/min)

The patient is cognitively impaired or  
demented

Polypharmacy ( $>5$ )



DART: Validation of a questionnaire

Probandencode:

### Questionnaire for patients

In which language do you communicate ?

Age:

#### My state of health

Yes No

- |                          |                          |   |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | I am suffering from a chronic renal disease                 |
| <input type="checkbox"/> | <input type="checkbox"/> | I am suffering from a chronic hepatic disease               |
| <input type="checkbox"/> | <input type="checkbox"/> | I am suffering from a chronic cardiac disease               |
| <input type="checkbox"/> | <input type="checkbox"/> | I am suffering from a chronic respiratory disease           |
| <input type="checkbox"/> | <input type="checkbox"/> | I am suffering from diabetes                                |
| <input type="checkbox"/> | <input type="checkbox"/> | I have troubles remembering things or tend to forgetfulness |

#### My medication

Yes No

- |                          |                          |   |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | I regularly take some medication which I bought by myself, without a prescription of my physician (incl. vitamins). |
| <input type="checkbox"/> | <input type="checkbox"/> | I take more than 5 drugs every day, prescribed by my physician.   |

I take the following drugs at home, regularly:

- |   |   |
|---|---|
| <input type="checkbox"/> Sleeping pills   | <input type="checkbox"/> Digoxin                          |
| <input type="checkbox"/> Cortison or other steroids   | <input type="checkbox"/> Detrusitol                       |
| <input type="checkbox"/> Medication against epilepsy  | <input type="checkbox"/> Insulin / Drugs against diabetes |
| <input type="checkbox"/> Marcoumar, Xarelto, Sintrom or Pradaxa   |   |
| <input type="checkbox"/> Surmontil (Trimipramin), Saroten (Tryptizol, Limbitrol), Tofranil oder Nortrilen |   |
| <input type="checkbox"/> Drugs against rheumatism / inflammation  |   |
| <input type="checkbox"/> Drugs for drainage (Diuretics)   |   |

# DART

## (Drug Associated Risk Tool)

Missing information, half-knowledge of the patient, the patient does not understand the goal of the therapy

The existence of a visual impairment/the patient has an impaired eye-sight

Therapy with medication, which is difficult to handle



DART: Validation of a questionnaire

Probandencode:

Do you ever forget to take your medicine?

☐ yes ☐ no

My medicine is a mystery to me.

☐ yes ☐ sometimes ☐ no

I sometimes worry about long-term effects of my medicines.

☐ yes ☐ sometimes ☐ no

My health in the future will depend on my medicines.

☐ yes ☐ sometimes ☐ no

My medicines protect me from becoming worse.

☐ yes ☐ sometimes ☐ no

I feel well informed about my medication.

☐ strongly agree ☐ agree ☐ disagree ☐ strongly disagree

### Use of medication

I have problems with the use of my medication:

☐ Difficulties with splitting ☐ Difficulties with visual recognizing

☐ Swallowing difficulties ☐ I don't have any problems

The management of my medication

☐ is done by myself

☐ is done by a relative / friend

☐ is done by a care person

I use some of these application forms:

☐ Spray for inhalation ☐ Syringe for self-injection

☐ Skin patch ☐ I don't use any of these application forms

Do you want to tell us more about your health and your medication?

Thank you for taking some time to fill out this questionnaire.

# DART - a self-assessment questionnaire

## (Drug Associated Risk Tool)



DART

Patient code: \_\_\_\_\_

### Questionnaire for patients

#### General information

What is your preferred language of communication? \_\_\_\_\_

What is your current age? \_\_\_\_\_

#### My state of health

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	I have a restricted kidney function/kidney dysfunction/kidney disease
<input type="checkbox"/>	<input type="checkbox"/>	I have a liver disease/liver dysfunction
<input type="checkbox"/>	<input type="checkbox"/>	I have a heart weakness/heart performance weakness
<input type="checkbox"/>	<input type="checkbox"/>	I have a chronic respiratory disease
<input type="checkbox"/>	<input type="checkbox"/>	I have diabetes
<input type="checkbox"/>	<input type="checkbox"/>	I have trouble remembering things or tend to be forgetful

If you do not take any medication, the questionnaire is finished for you.

#### My medicine

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	I regularly take medicine, which I bought myself without a prescription (including vitamin supplements)
<input type="checkbox"/>	<input type="checkbox"/>	I take more than 5 drugs every day, which are prescribed

I use the following drugs at home (before my hospitalization):

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Sleeping pills
<input type="checkbox"/>	<input type="checkbox"/>	Cortison
<input type="checkbox"/>	<input type="checkbox"/>	Medicine against pain
<input type="checkbox"/>	<input type="checkbox"/>	Medicine against depression (e.g. Tofranil or Nortril)
<input type="checkbox"/>	<input type="checkbox"/>	Medicine against anxiety (e.g. Valium)
<input type="checkbox"/>	<input type="checkbox"/>	Medicine against heart disease
<input type="checkbox"/>	<input type="checkbox"/>	Digoxin
<input type="checkbox"/>	<input type="checkbox"/>	Detrusitol
<input type="checkbox"/>	<input type="checkbox"/>	Insulin / Medicine against diabetes

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Do you sometimes forget to take your medicine?



DART

Patient code: \_\_\_\_\_

Yes	Partially	No	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I'm worried about taking my medicine.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sometimes I worry about the long term effects of my medicine.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I do not understand what my medicine is for.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	My medicine interferes with my life.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sometimes I worry about becoming dependent on my medicine.
I feel well informed about my medicine.			
Strongly disagree		Disagree	Agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Application of medicine

I am having trouble with the application of my medicine:

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	The application of my medicine is done by myself
<input type="checkbox"/>	<input type="checkbox"/>	The application of my medicine is done by a relative / a friend
<input type="checkbox"/>	<input type="checkbox"/>	The application of my medicine is done by a home care institution

I use one of the following application forms

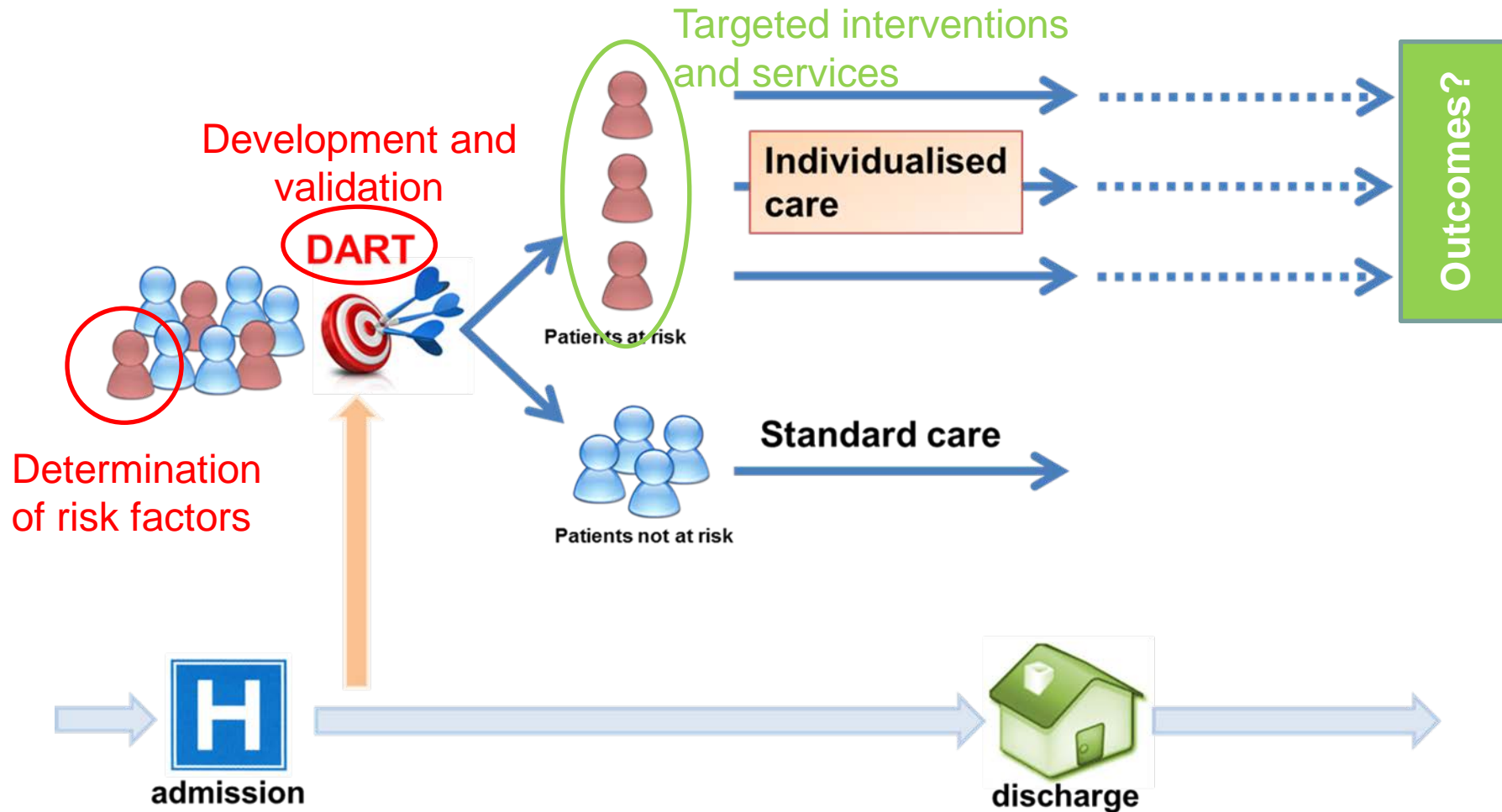
Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Inhalation device
<input type="checkbox"/>	<input type="checkbox"/>	Syringe for self injection
<input type="checkbox"/>	<input type="checkbox"/>	Skin patch

Would you like to tell us more about your health and medicine?

Thank you very much for taking the time to fill out this questionnaire.

Kaufmann CP, et al. *BMJ Open* 2018;8:e016610.  
doi:10.1136/bmjopen-2017-016610

# Summary and outlook



# Four patients – are they at risk for DRPs?



**Mrs. A.B., 63 years old**

- Lives with her husband
- High school
- Cleaning woman
- Diagnosis: 3
- Medications: 4

**DART Score 3**



**Mrs. B.C., 55 years old**

- Lives with her husband, frequent travels
- University of applied science
- Diplomatic service
- Diagnosis: 6
- Medications: 8

**DART Score 9**



**Mr. C.D., 90 years old**

- Lives alone in a house
- Apprenticeship
- Retired
- Diagnosis: 11
- Medications: 7

**DART Score 2**



**Mr. D.E., 52 years old**

- Lives alone in a flat
- Apprenticeship
- Unemployed
- Diagnosis: 7
- Medications: 12

**DART Score 8**



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**Thank you**  
for your participation.