

# Quantitative metrics and quality indicators to assess antibiotic use

## Output of the **DRIVE-AB** project

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*Train-the-trainer course – 10<sup>th</sup> of April 2016*

# Background

- Antibiotic use is frequently inappropriate, both in the outpatient and inpatient settings<sup>1,2</sup>
- Antibiotic consumption varies significantly across countries<sup>3</sup>
- There is huge methodological variability in the evaluation of antibiotic use



Need for standardized indicators and metrics  
for an appropriate qualitative and quantitative evaluation  
of antibiotic use

1: Adriaenssens N et al., J Antimicrob Chemoth 2011

2: Hulscher ME et al., Lancet Infect Dis 2010

3: [http://ecdc.europa.eu/en/healthtopics/antimicrobial\\_resistance/esac-net-database/Pages/database.aspx](http://ecdc.europa.eu/en/healthtopics/antimicrobial_resistance/esac-net-database/Pages/database.aspx)

# Objectives

Obtain global consensus on:

1. Quality indicators of responsible antibiotic use
2. Quantity metrics of responsible antibiotic use

# Methods: definitions

- A **quality indicator** reflects the degree in which an antibiotic prescription is correct or appropriate.

example: 'Empirical antibiotic therapy should be prescribed according to the local guidelines'

- A **quantity metric** reflects the volume or the costs of antibiotic use.

example: 'Consumption of antibiotics expressed in DDD per 1000 inhabitants and per day'

# Methods: protocol

Quality Indicators (QI) Structure/Process/Outcome measures		Quantity Metrics (QM)	
Inpatient (IQI)	Outpatient (OQI)	Inpatient (IQM)	Outpatient (OQM)
Radboudumc 	University of Lorraine  UNIVERSITÉ DE LORRAINE	University of Rijeka  Sveučilište u Rijeci University of Rijeka	University of Antwerp  University of Antwerp

# Methods: protocol

## 4-step RAND-modified Delphi procedure

1. Systematic review of the literature
2. First online survey of a multidisciplinary expert panel
3. Face-to-face consensus meeting
4. Second online survey of the multidisciplinary expert panel

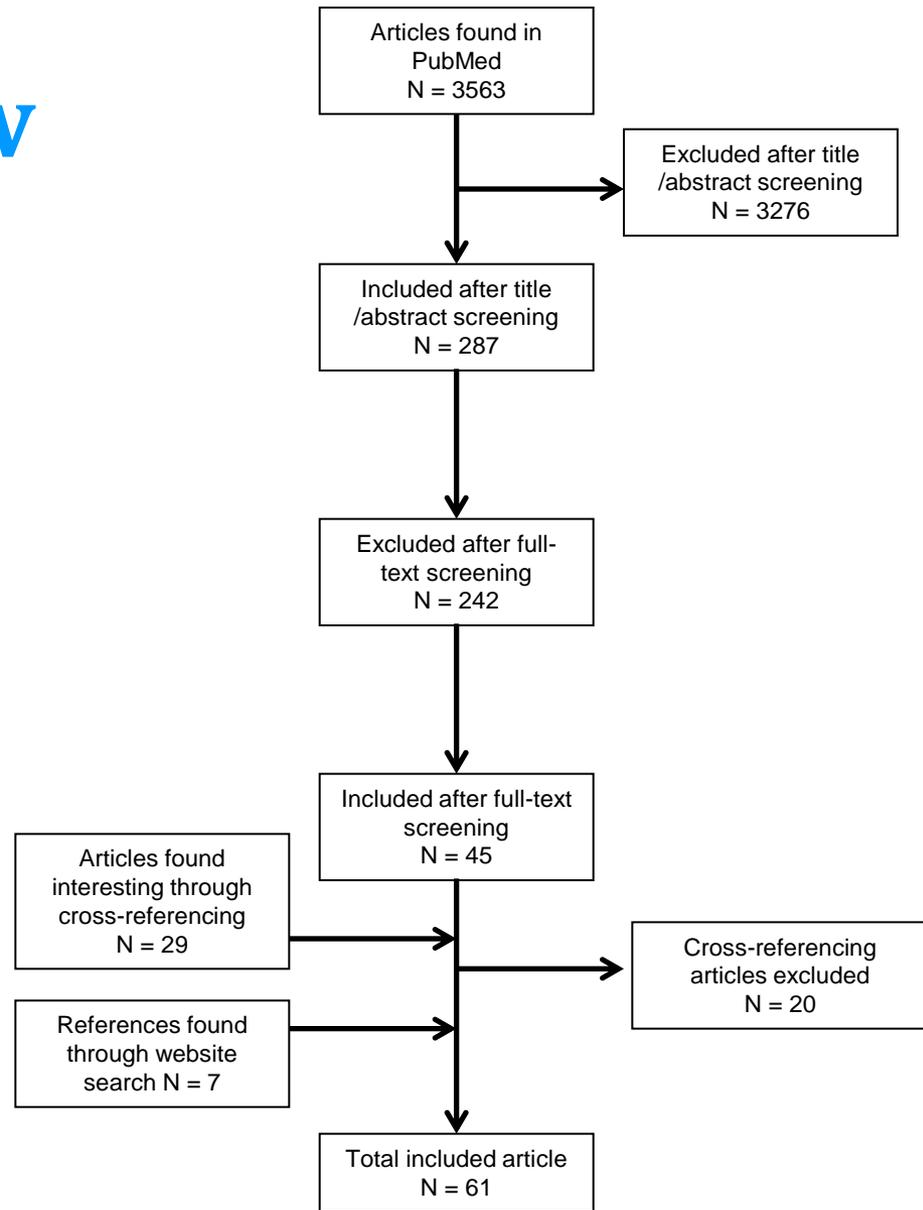
Schouten et al., Clin Infect Dis 2005;  
Hermanides et al., Clin Infect Dis 2008;  
Van den Bosch et al., BMC Infect Dis 2014

# Systematic review

- Medline + websites' search
- 2 independent reviewers

## Example: for OQIs

- 96 search terms organised around 7 « concepts »
- 3563 articles for title/abstract screening
- 325 articles for full text screening
- 61 included references



# Consensus procedure (1)

- First online survey (SurveyMonkey®)

- Sent to a multidisciplinary panel of experts (stakeholders)
- Appraisal of the relevance of indicators/metrics for 'assessing the quality of antibiotic use' or 'measuring the quantity of antibiotic use'

↳ Likert scale ranging from 1 to 9 + 'I cannot assess'

Median Rating Level of agreement	Likert Scale $\geq 8$	Likert Scale $< 8$
Agreement: $\geq 70$ % highest percentiles	Selection	Exclusion
Disagreement: $< 70$ % highest percentiles	Discussion	Exclusion

# Consensus procedure (2)

## The stakeholders:

- **Medical Community**  
GPs, Medical specialists, Clinical Societies, Pharmacists and Clinical Pharmacologists, Nurses
- **Patients/Global Public Health**  
Patient societies, Public health, (bio)ethicists/jurists
- **R&D/Pharmaceutical Industry**  
Big pharma, small/medium Companies, Economists, Health Economists
- **Payers/Policy makers/Government/Regulators**

# Consensus procedure (3)

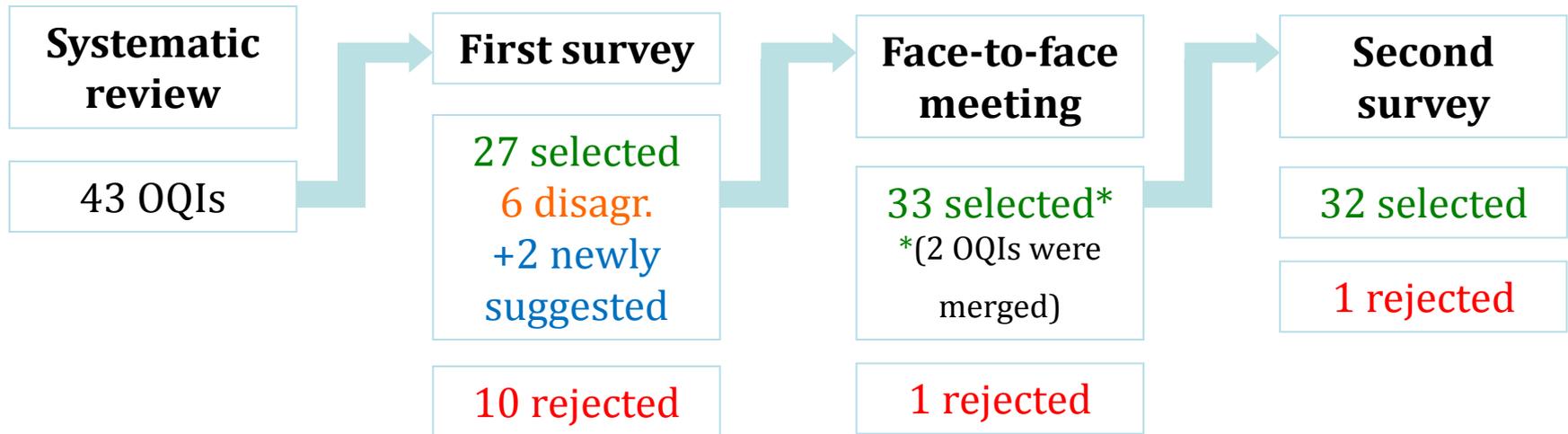
- Face to face meeting: 30th of September 2015 at Schiphol (NL)

- Discussion among stakeholders to solve disagreements observed in the first survey
- Evaluation of indicators/metrics newly suggested during the first survey

- Second online survey (SurveyMonkey®)

- Final validation of indicators/metrics
  - ↳ Accept/reject + reason(s) for disagreement

# Results: Outpatient quality indicators (OQIs)



# Results: some of highest appraised OQIs

- **‘generic’ OQIs:**
  - OQI-3 Outpatients should receive antibiotic therapy compliant with guidelines; this includes, but is not limited to indication, choice of the antibiotic, duration, dose and timing.
  - OQI-13 Antibiotics in stock should not be beyond the expiry date.
  - OQI-14 Antibiotics that are dispensed to outpatients should be adequately labelled (patient name, antibiotic's name, when antibiotics should be taken).
- **OQIs for Outpatient Parenteral Antibiotic Treatment (OPAT):**
  - OQI-23 All OPAT plans should include dose, frequency of administration and duration of therapy.
  - OQI-25 Administered doses of OPAT intravenous therapy should be documented on a medication card.
  - OQI-30 The OPAT (Outpatient Antibiotic Parenteral Treatment) plan should be communicated to the general practitioner (GP) at discharge.

# Results: one example of OQI

**OQI-5 Acute upper respiratory infections and bronchitis should not be treated with antibiotics within the first three days, unless there is documented indication for treatment**

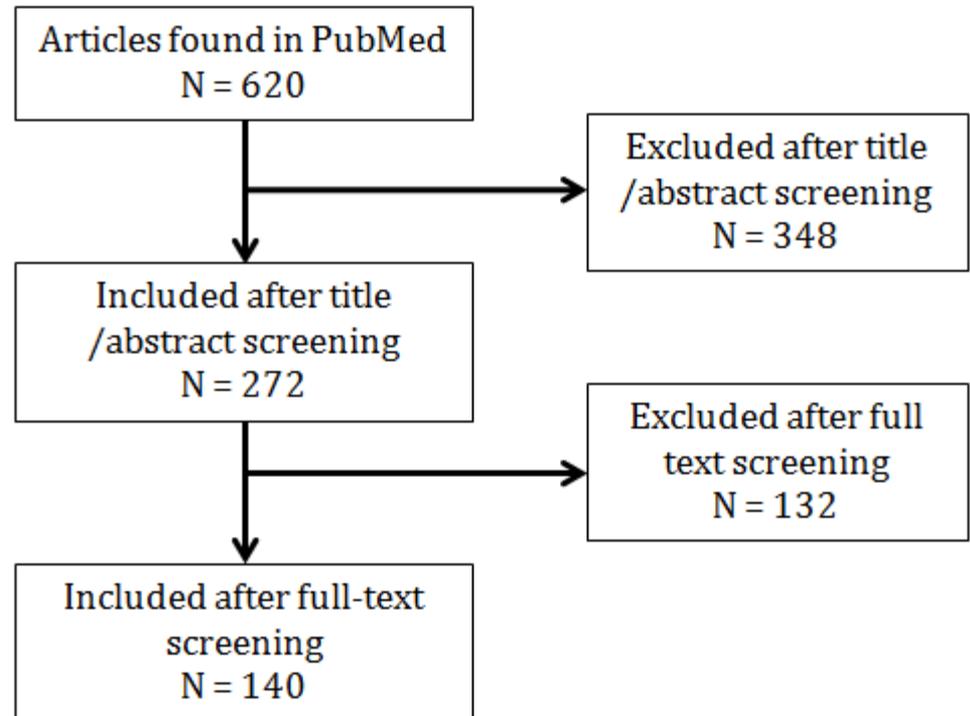
Clinical situation	Numerator	Denominator	References
Delayed AB prescribing strategy should be agreed for patients with the included conditions	Patients with delayed prescribing	Patients with the included conditions (acute otitis media, acute sore throat/ acute pharyngitis/ acute tonsillitis, common cold, acute rhinosinusitis, acute cough/ acute bronchitis.)	NICE – 2008 (29)
Acute upper respiratory infection (AURTI)	Number of patients with an AURTI where the AB are avoided within 3 days of unique visit	Number of patients with an AURTI	Wessel – 2008 (30)
Acute otitis media	Patients > 2 yo with less than 3 days of symptoms of AOM with AB	Patients > 2 yo with AOM	Hansen – 2010 (4) Hansen – 2013 (5)
Acute bronchitis	Number of patients with an acute bronchitis where the AB are avoided within 3 days of unique visit	Number of patients with an acute bronchitis	Wessel – 2008 (30)
Acute pharyngitis	Number of patients with an acute pharyngitis where the AB are avoided within 3 days of unique visit	Number of patients with an acute pharyngitis	Wessel – 2008 (30)

# Systematic review: IQIs

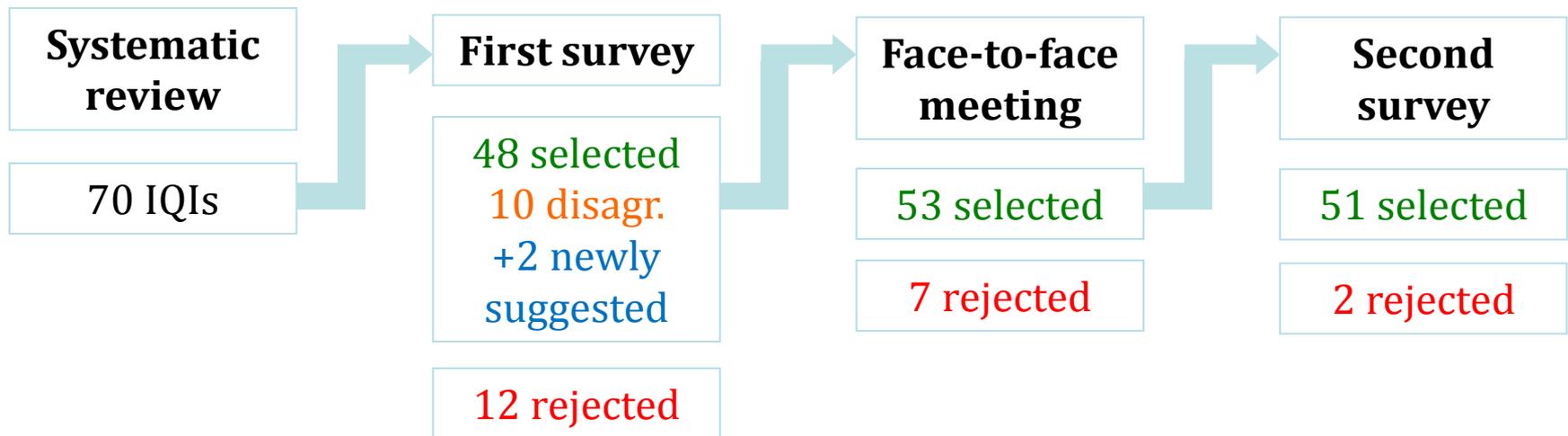
- Medline + websites' search
- 2 independent reviewers

## For IQIs

- 20 search terms organised around 2 « concepts »
- 620 articles for title/abstract screening
- 272 articles for full text screening
- 140 included articles



# Results: Inpatient quality indicators (IQIs)



# Results: highest appraised IQIs

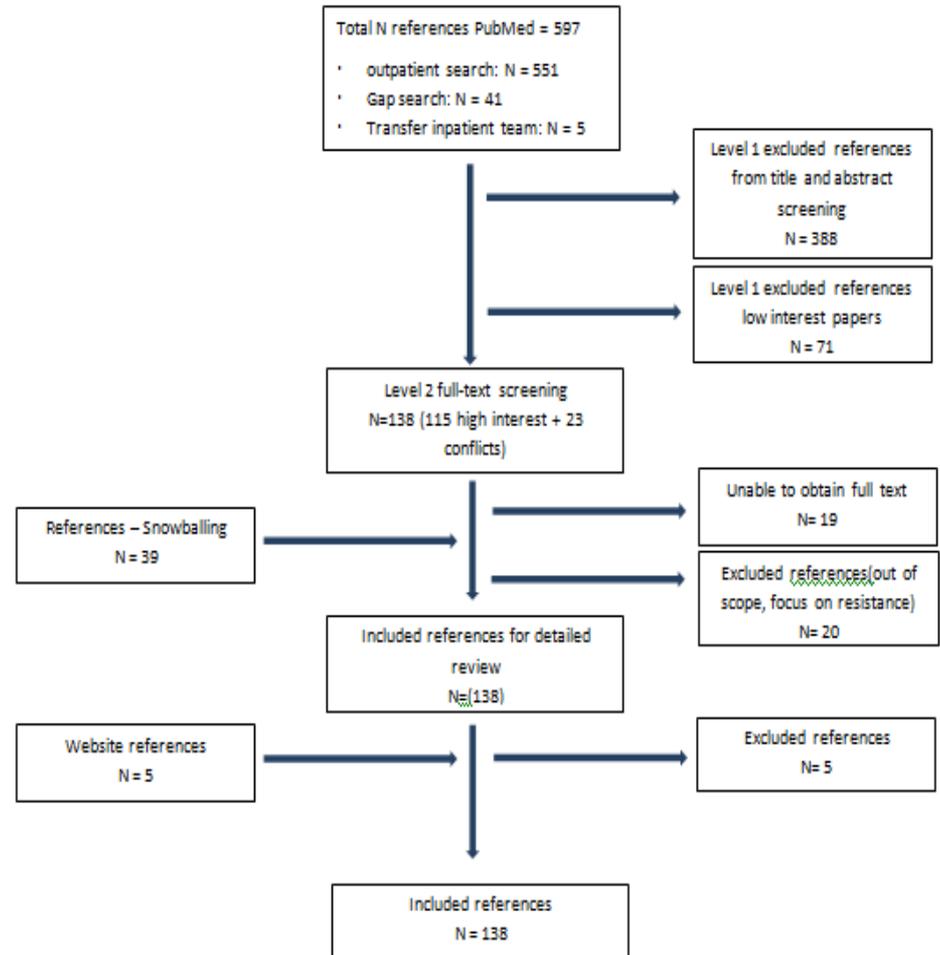
- IQI-9 An antibiotic stewardship programme (antibiotic prescribing control programme and/or antibiotic prescribing policy) should be in place at the health care facility.
- IQI-17 An antibiotic plan should be documented in the medical record at the start of the antibiotic treatment. (Antibiotic plan includes: indication, name, doses, duration, route, and interval of administration)
- IQI-19 The results of bacteriological susceptibilities should be documented in the medical records.
- IQI-34 The local guidelines should correspond to the national guidelines but should be adapted based on local resistance patterns.
- IQI-49 Allergy status should be taken into account when antibiotics are prescribed.

# Systematic review: OQMs

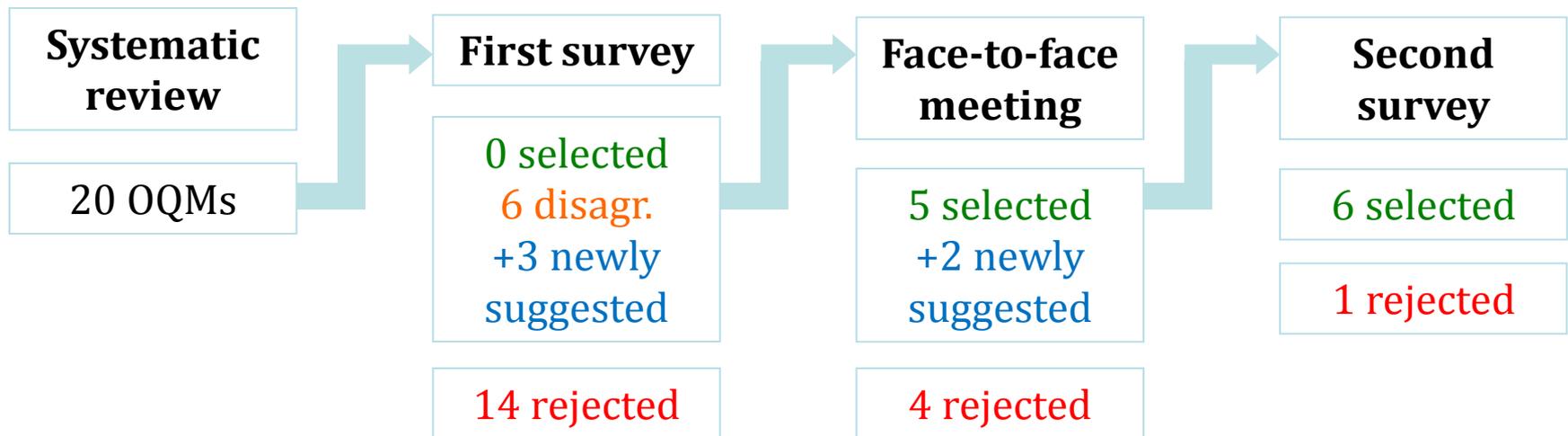
- Medline + complementary websites' search

## For OQMs

- 66 OQMs based on metric numerator
- 597 articles for title/abstract screening
- 138 included articles



# Results: Outpatient quantity metrics (OQMs)



# Results: OQMs

OQM-1 DDD per defined population

OQM-2 Treatments/courses per defined population

OQM-3 Treatments/courses per physician contacts

OQM-4 Prescriptions per defined population

OQM-5 Prescriptions per physician contact

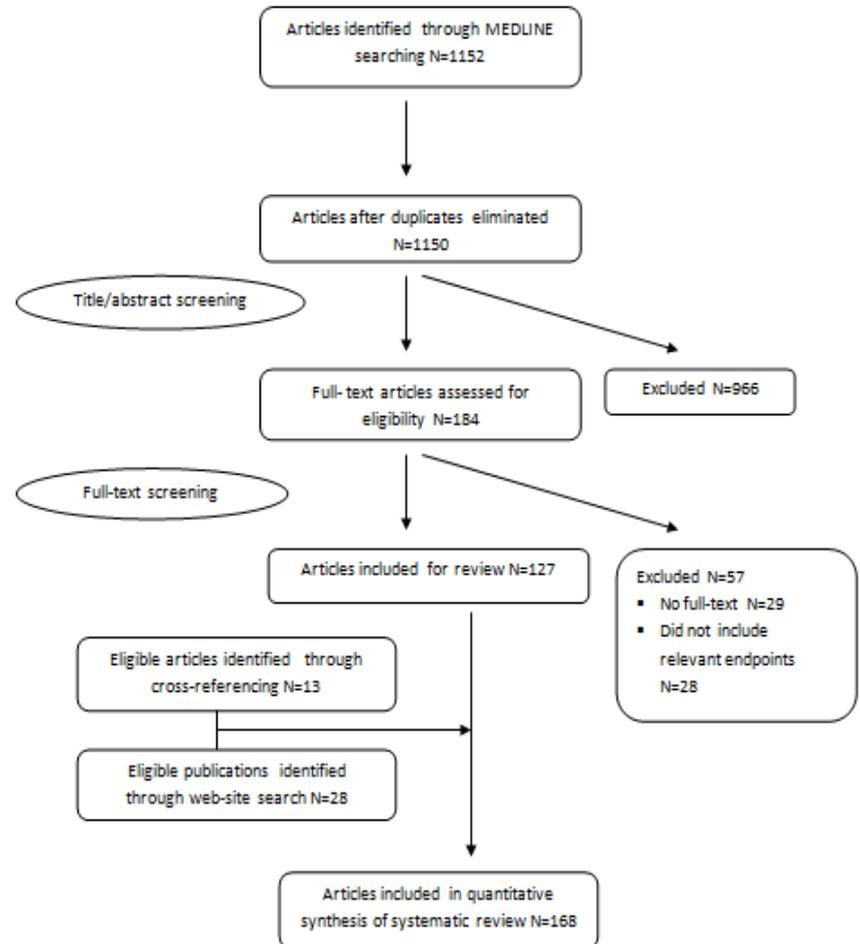
OQM-6 Seasonal variation of total antibiotic use

# Systematic review: IQMs

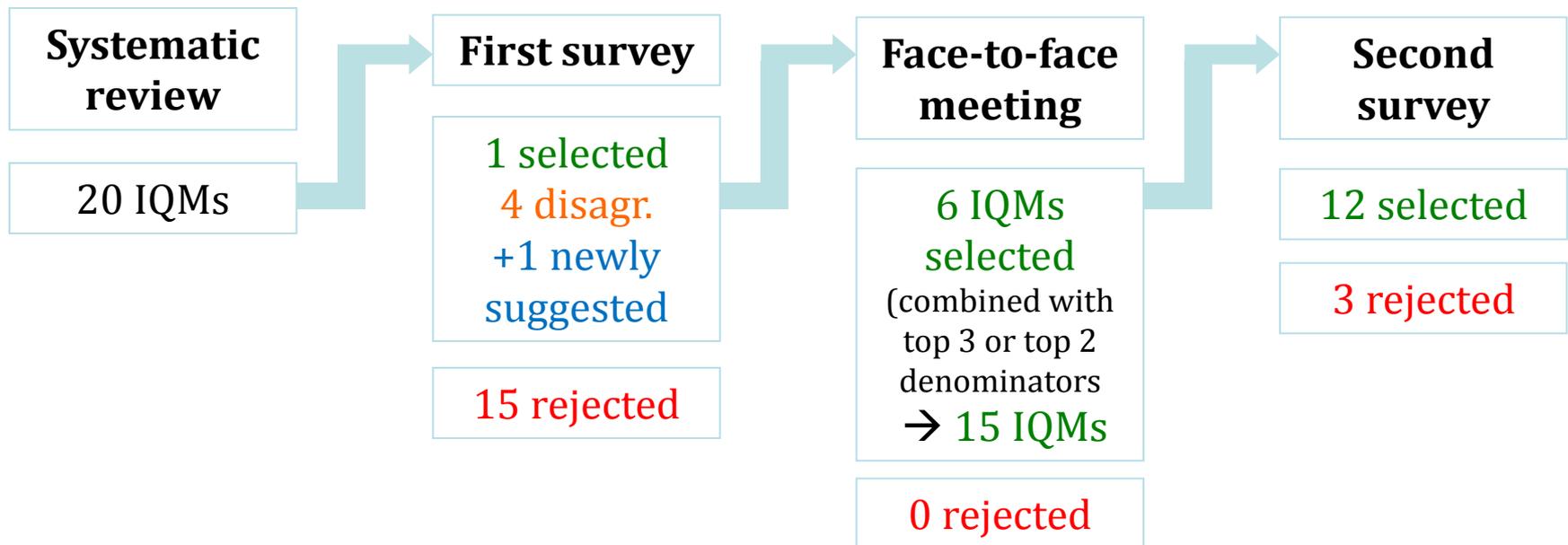
- Medline + references + websites' search
- 3 independent reviewers

## For IQMs

- 73 nominator/denominator combinations organised around 20 groups
- 1150 articles for title/abstract screening
- 168 included articles



# Results: Inpatient quantity metrics (IQMs)



# Results: some examples of IQMs

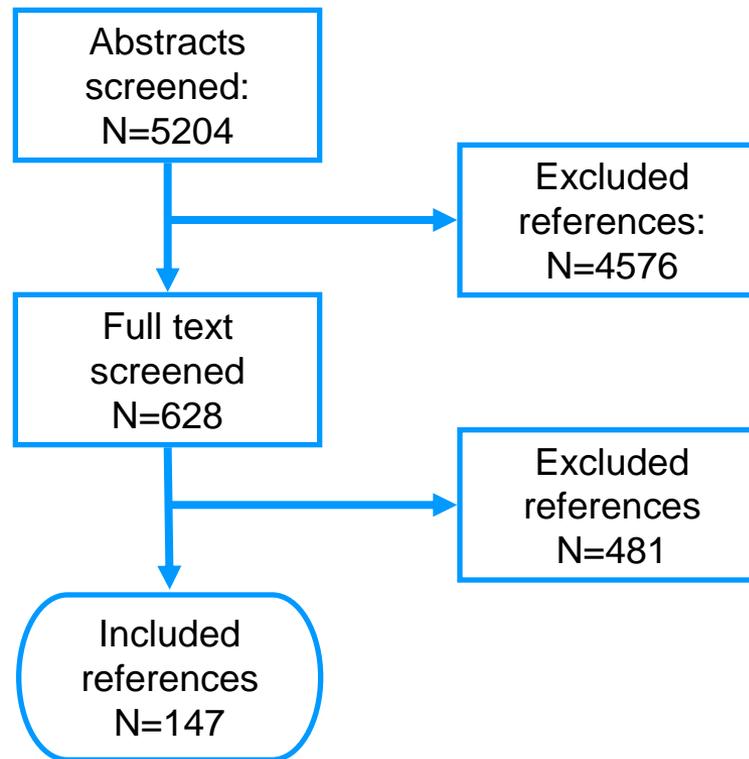
- **IQMs 1-3: Defined Daily Dose (DDD)**
  - per 100(0) PD/ BD/ OBD
  - per Admissions
  - per (100 BD per CMI)
- **IQMs 5-7: Days of Therapy (DOT)**
  - per Patient Days
  - per Patients
  - per Admissions
- **IQM-12: Antibiotic use should be preferably expressed in at least two metrics simultaneously**

# Further developments of DRIVE-AB indicators and metrics

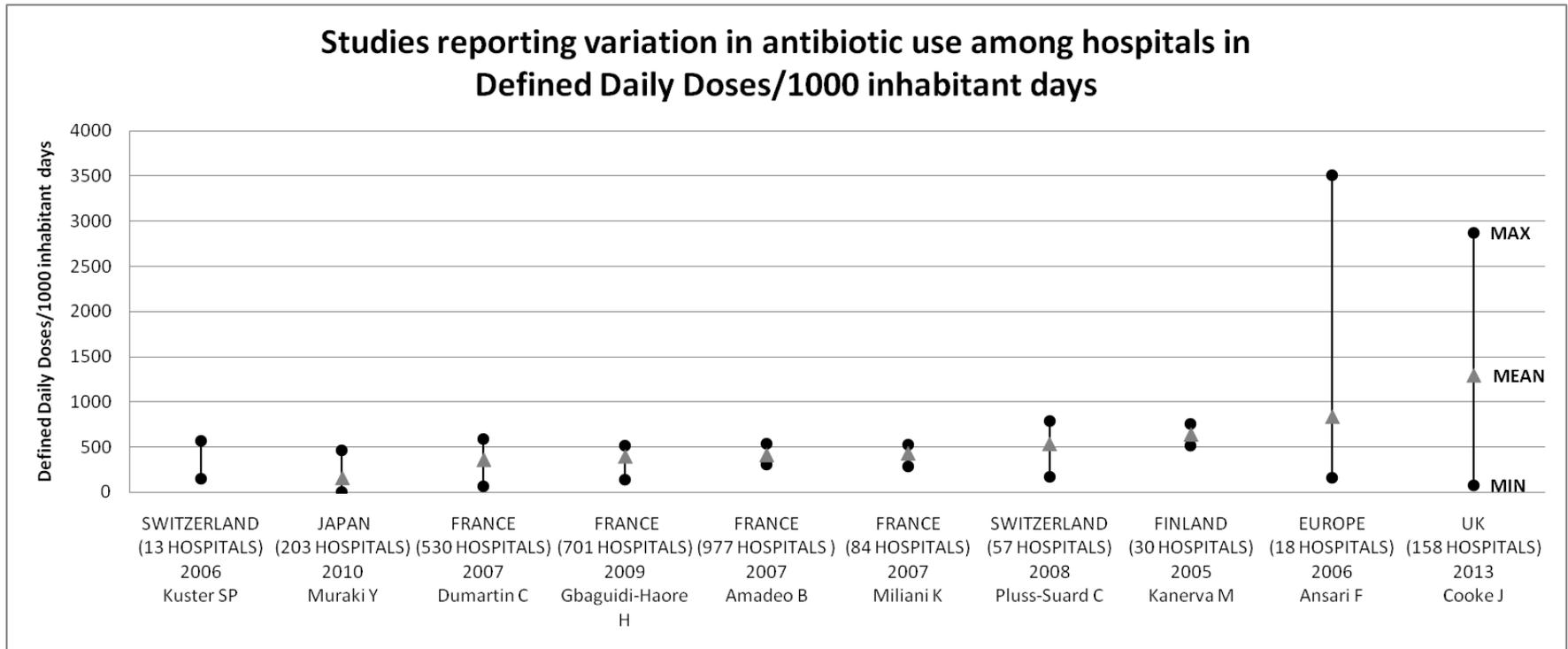
- Evaluation of feasibility in different settings
- Application in clinical studies
- Implementation in antimicrobial stewardship policies
- Use for education/teaching material

# Variation in metrics / indicators

- Systematic review of studies describing variation in antibiotic use metric / indicators (2004-2015)

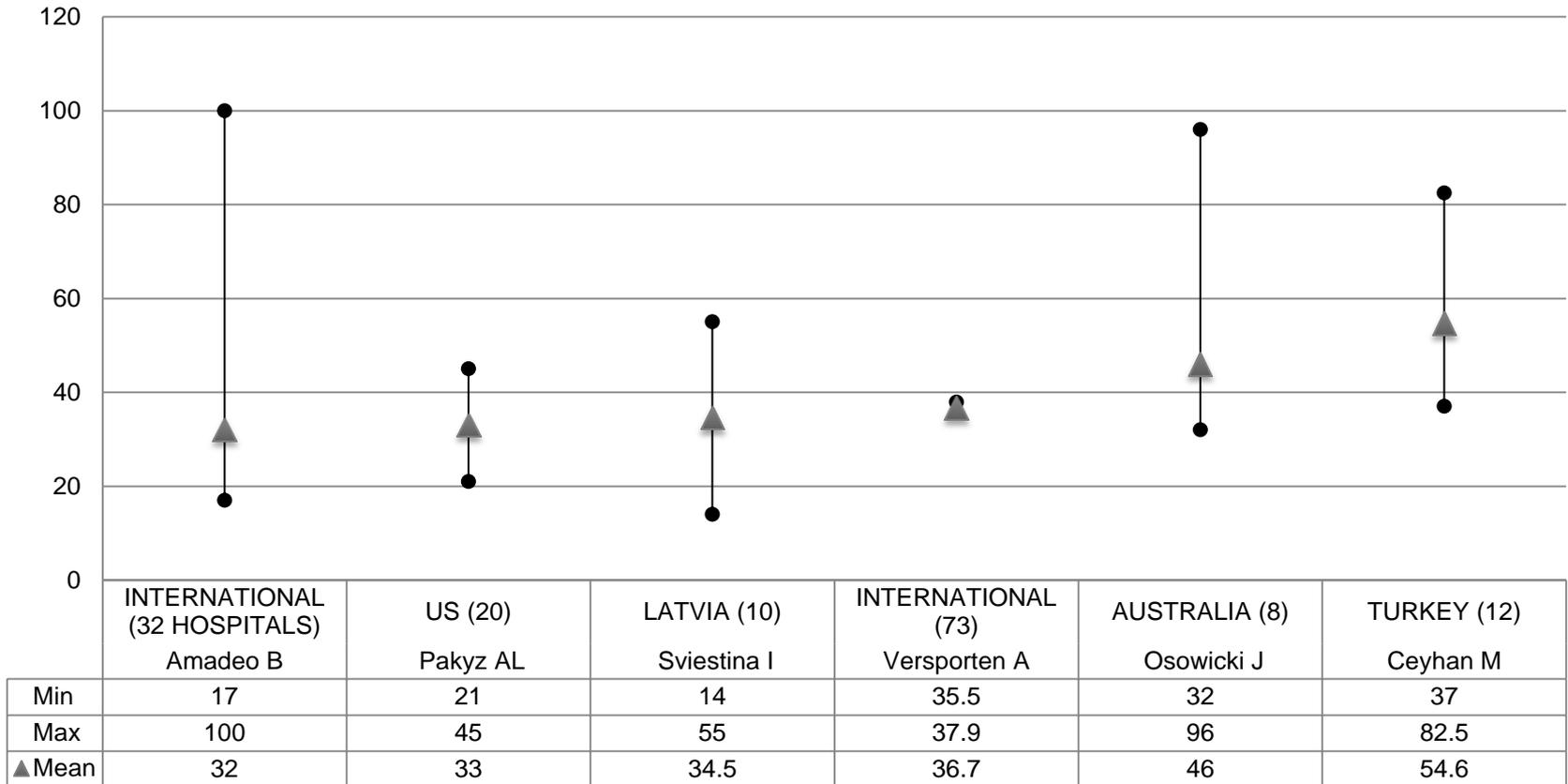


# Variation in metrics



# The reasons for the observed variation remain ill-explained

% of children treated with antibiotics



# DRIVE-AB WP-1a:

## 5 presentations at ECCMID 2016 !

#P1291 Metrics for quantifying antimicrobial use in the inpatient setting: results from a systematic review

**Paper Poster** Session, Poster area

**Monday, 11 April 2016 - 13:30 - 14:30**

#P1294 Variation in indicators of antibiotic use among and within different settings: a systematic review

**Paper Poster** Session, Poster area

**Monday, 11 April 2016 - 13:30 - 14:30**

#P1328 Quality indicators assessing antibiotic use in the outpatient setting: a systematic review followed by consensus procedure

**Paper Poster** Session, Poster area

**Monday, 11 April 2016 - 13:30 - 14:30**

#EP0126 Quantity metrics assessing antibiotic use in the outpatient setting: a global consensus procedure

**ePoster** Session, Poster area

**Tuesday, 12 April 2016 - 12:30 - 13:30**

#0599 Quality indicators of antibiotic use in the inpatient setting: a global consensus procedure. 2-hour **Oral**

**Session**

Hall C

**Tuesday, 12 April 2016 - 13:30 - 15:30**

**Thanks for  
your attention!**