

Quality indicators and quantitative metrics for responsible antibiotic use, lessons from DRIVE-AB project

Vera Vlahovic-Palcevski (Rijeka, Croatia)

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DRIVE-AB



- Funded by the Innovative Medicines Initiative
 - New Drugs for Bad Bugs program
 - 16 public and 7 private partners from 11 countries
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- Provide answers to the following issues:
 - Reduce antibiotic resistance through responsible antibiotic use
 - Identify how to incentivise the discovery and development of new novel antibiotics through new economic models



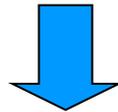
DRIVE – AB objectives

- **Define “responsible” use of antibiotics**
- Set, communicate and revise public health priorities
- Develop antibiotic valuation models
- Create, test and validate new economic models

October 2014 → October 2017

Background (WP 1A)

- Antibiotic use is frequently inappropriate, both in the outpatient and inpatient settings^{1,2}
- Antibiotic consumption varies significantly across countries³
- There is a 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

Objectives (WP1A)

Obtain global consensus on:

1. Definition of responsible antibiotic use
2. Quality indicators of responsible antibiotic use
3. 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)		Quantity Metrics (QM)	
Inpatient (IQI)	Outpatient (OQI)	Inpatient (IQM)	Outpatient (OQM)
Radboudumc 	University of Lorraine 	University of Rijeka 	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

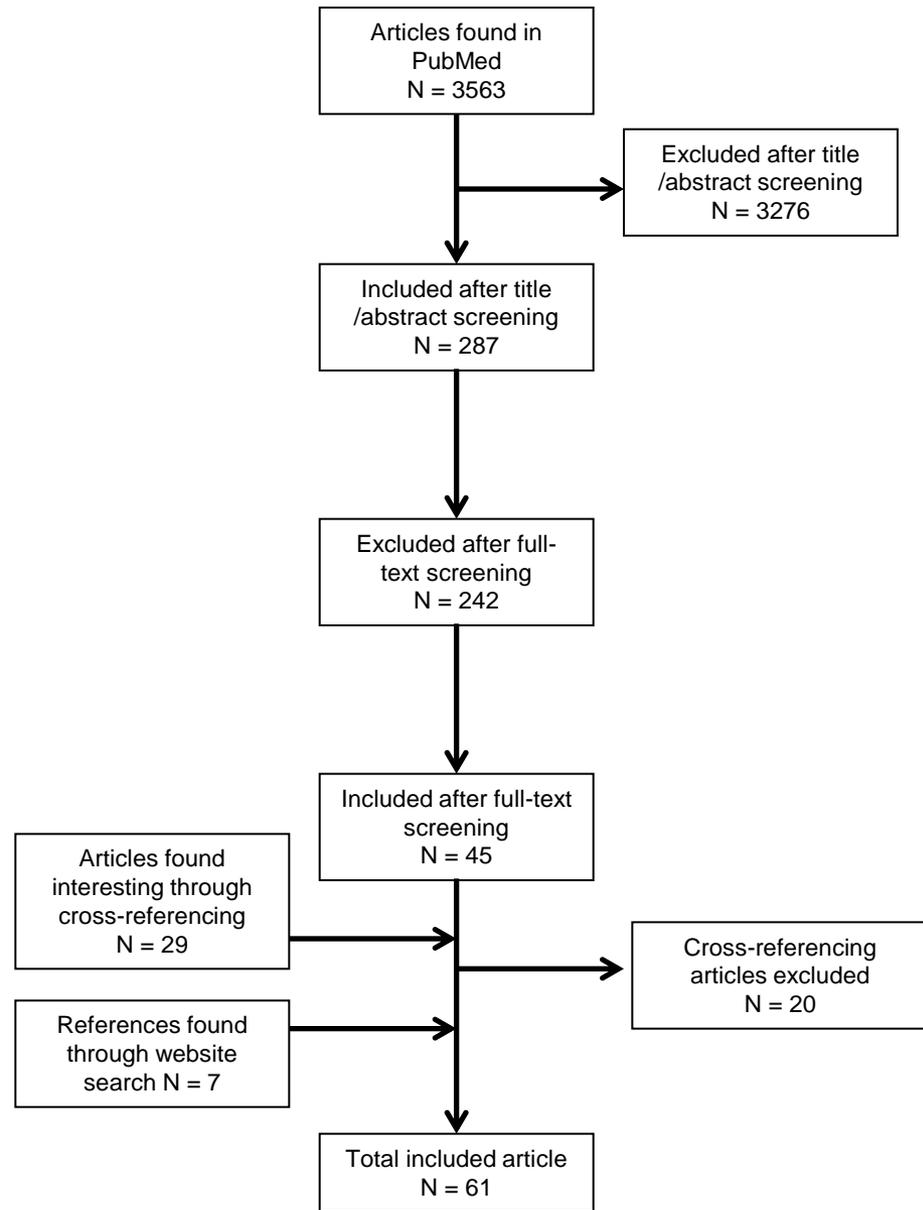
Schouten et al., Clin Infect Dis 2005;
Hermanides et al., Clin Infect Dis 2008;
Van den Bosch et al., BMC Infect Dis 2014

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)

DRIVE-AB stakeholders	A. Medical Community	B. Patients/ Global Public Health/Ethicists	C. R&D: Pharma/ SME, (health)-economists	D. Payers/Policy Makers/Governments/Regulators
Inpatient survey	5 medical specialists 2 pharmacists 3 professional societies: ESGAP/ESCMID, SPILF, ID Hellenic SC	3 (e.g. WHO, Chennai Declaration Group)	3 pharma 1 SMEs 1 Economist 2 HE	5 (e.g. CDC, EMA)
Outpatient survey	3 medical specialists 2 pharmacists 3 GPs 3 professional societies: ISC, API, ISID	3 (e.g. ReAct)	4 pharma 2 SMEs	3 (e.g. CDC, ECDC)

47 stakeholders, 20 countries, 6 continents

Consensus procedure (2)

- First online survey (SurveyMonkey®)

- Sent to a 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 ≥ 8	Likert Scale < 8
Agreement: ≥ 70 % highest percentiles	Selection	Exclusion
Disagreement: < 70 % highest percentiles	Discussion	Exclusion

Consensus procedure (3)

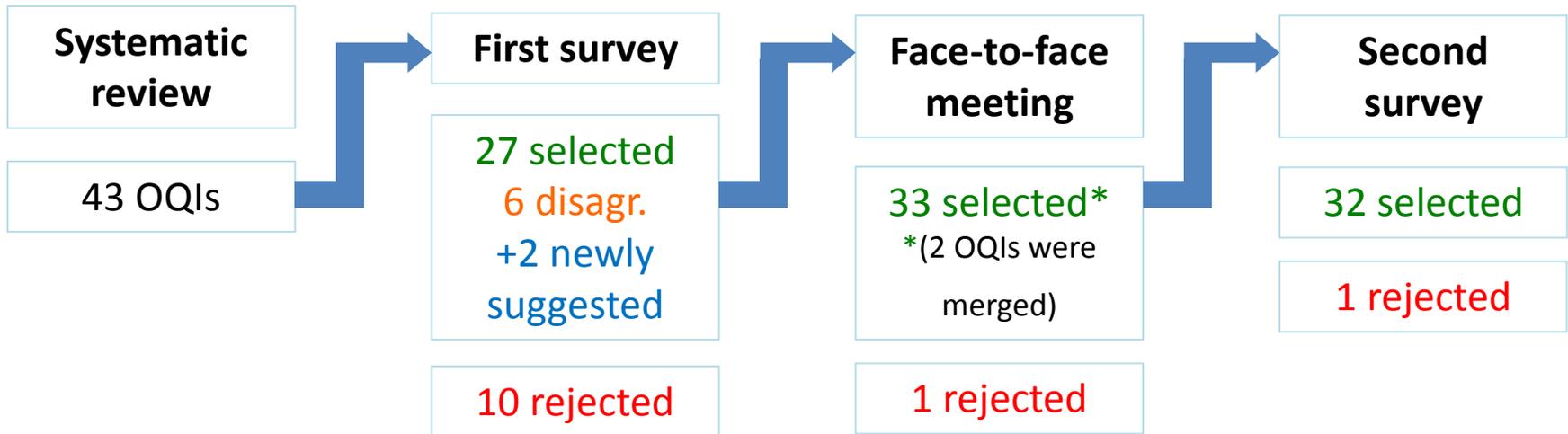
- Face to face meeting: 30th of September 2015 at Schiphol (NL)

- 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: highest appraised OQIs

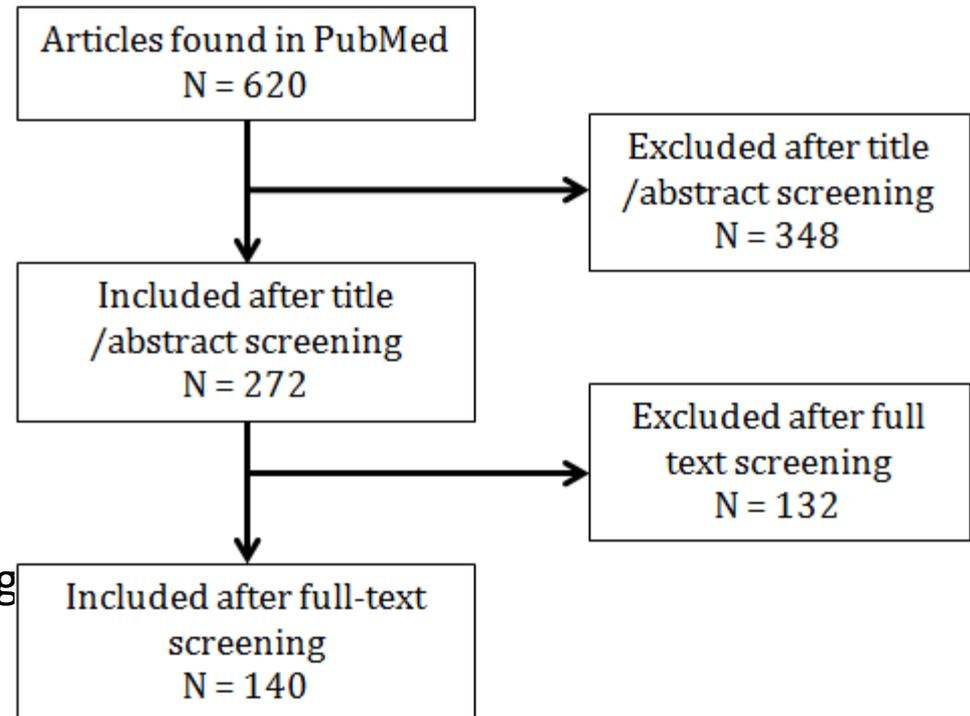
- **OQIs for general practice:**
 - OQI-3 Outpatients should receive antibiotic therapy compliant with guidelines; this includes, but is not limited to indication, choice of the antibiotic, duration, dose and timing.
 - OQI-13 Antibiotics in stock should not be beyond the expiry date.
 - OQI-14 Antibiotics 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.

Systematic review: IQIs

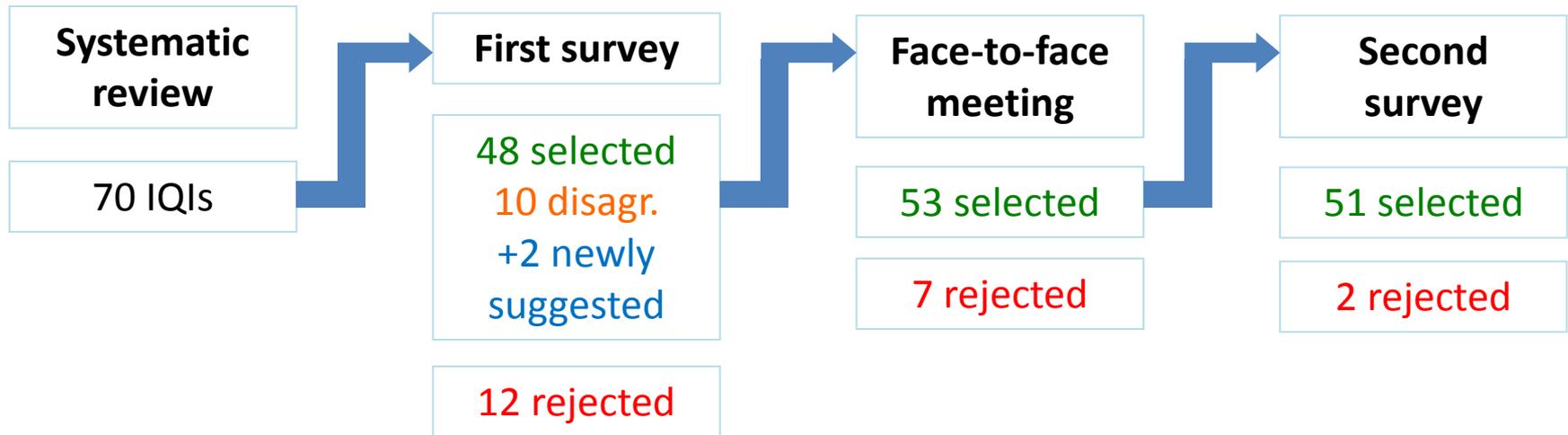
- Medline + websites' search
- 2 independent reviewers

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

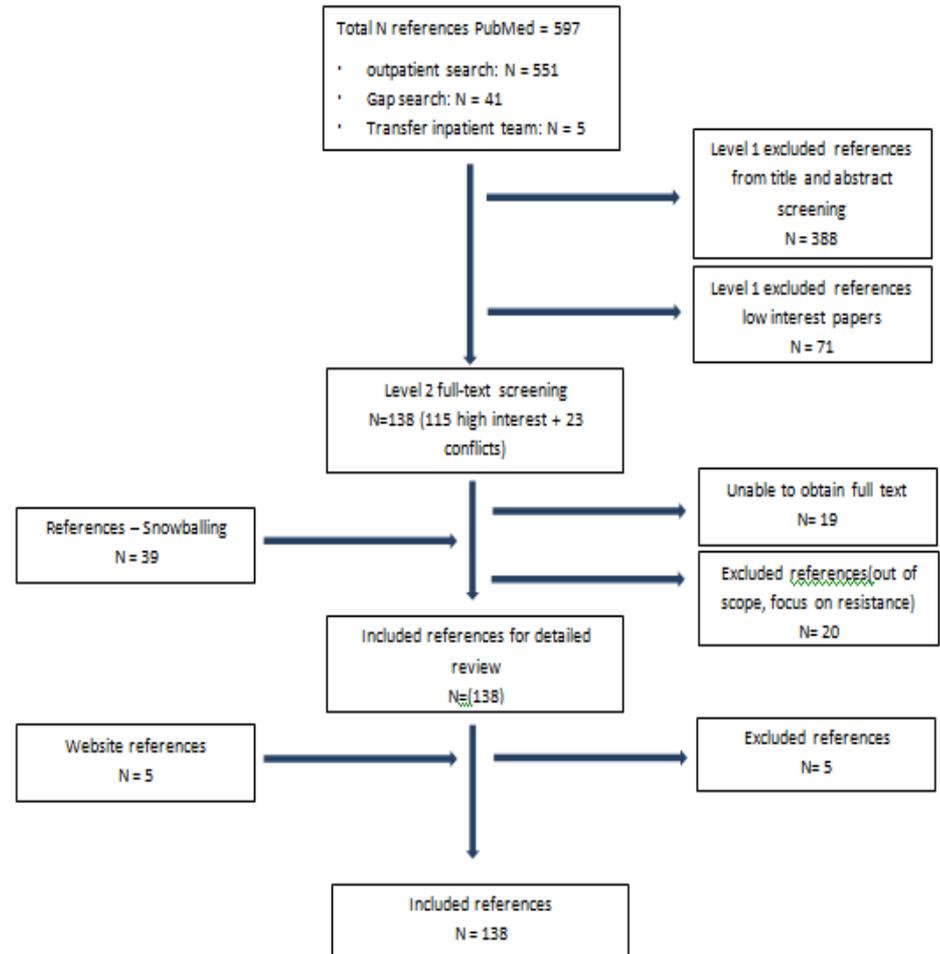
- IQI-9 An antibiotic stewardship programme (antibiotic prescribing control programme and/or antibiotic prescribing policy) should be in place at the health care facility.
- IQI-17 An antibiotic plan should be documented in the medical record at the start of the antibiotic treatment. (Antibiotic plan includes: indication, name, doses, duration, route, and interval of administration)
- IQI-19 The results of bacteriological sensitivities should be documented in the medical records.
- IQI-34 The local guidelines should correspond to the national guideline 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

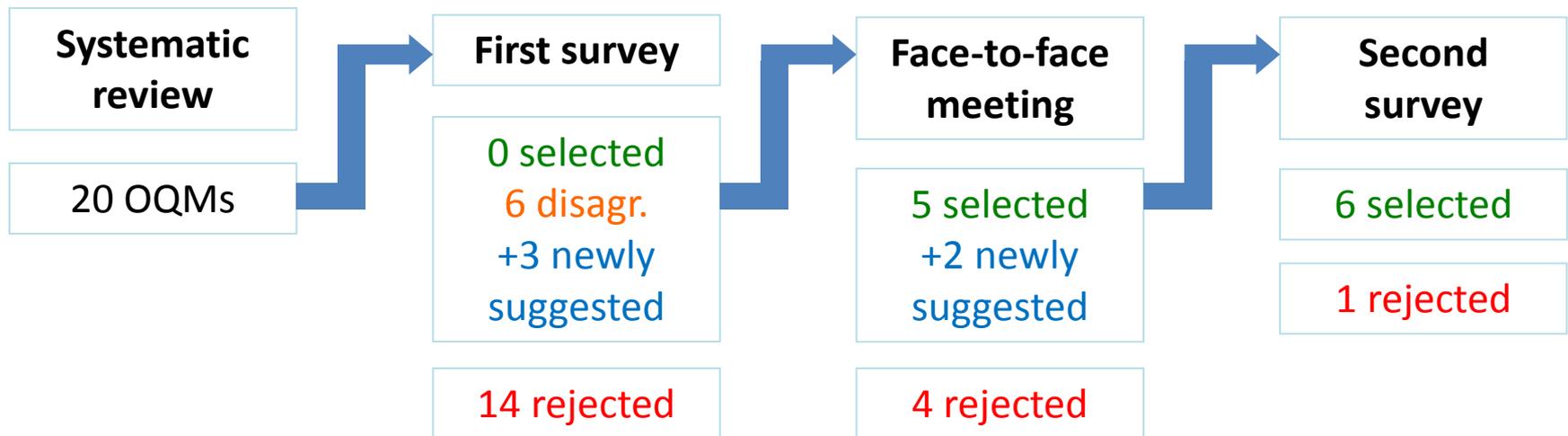
- Medline + complementary websites' search

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

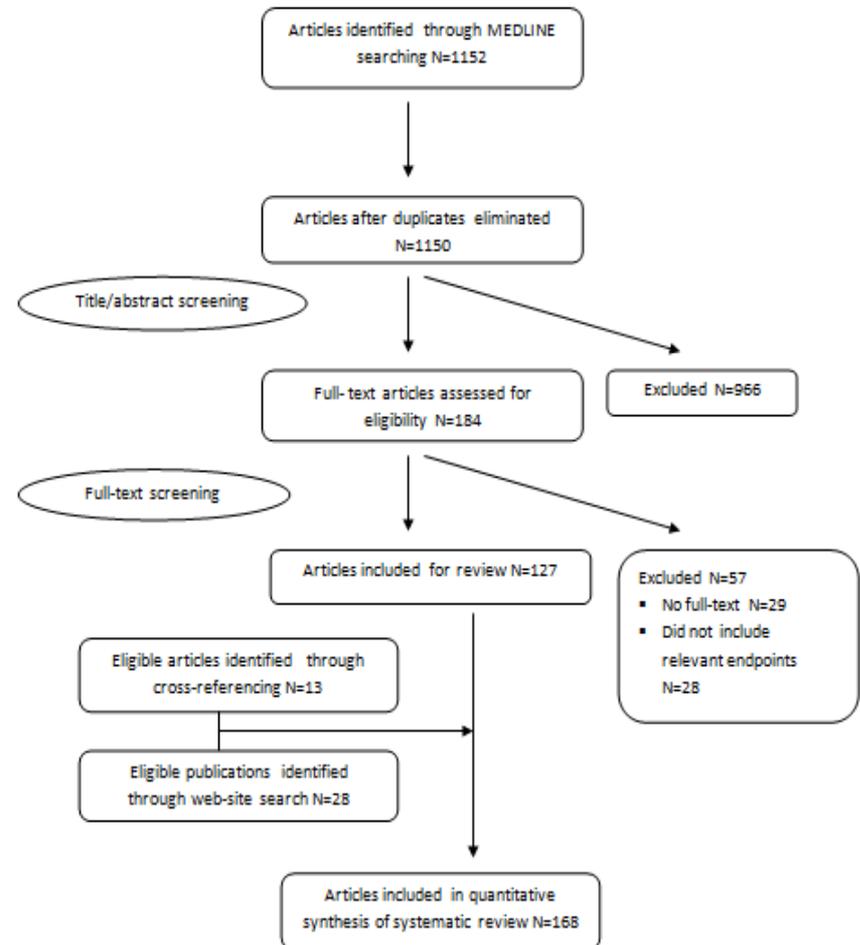
OQM-6 Seasonal variation of total antibiotic use

Systematic review: IQMs

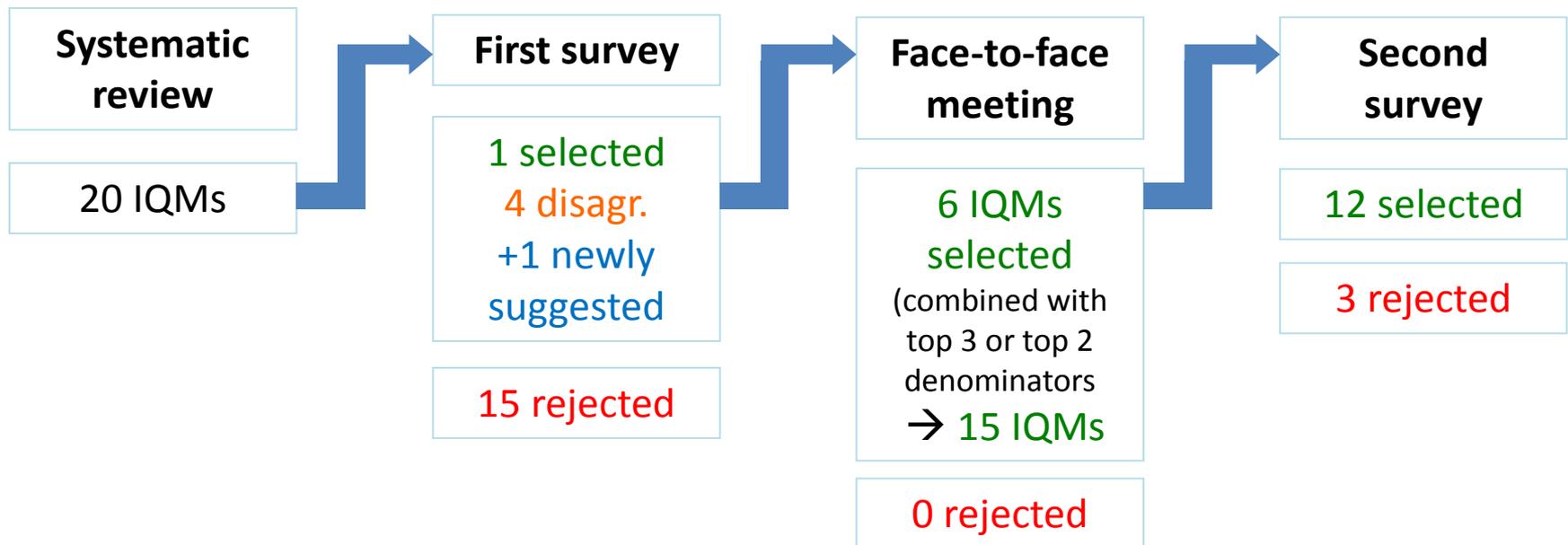
- Medline + references + websites' search
- 3 independent reviewers

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**

http://drive-ab.eu/wp-content/uploads/2014/09/WP1A_Final-QMs-QIs_final.pdf

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

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