



Quality indicators for medicines utilisation: Development and implementation

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- • What are prescribing indicators?
- • Types of prescribing indicators
- • Developing indicators
 - Defining prescribing quality
 - Data sources
- • Indicator validity

Activity 1: What is a prescribing indicator?

- • What indicators or indicator sets do you know?
 - What is their purpose?
 - What data do they need?
 - How and where are they used?

WHO drug use indicators

- First published 1993
- Small number of basic indicators/tools for quantifying and assessing a few critical aspects of pharmaceutical use in primary care

WHO Core Drug Use indicators

- **Prescribing Indicators**
 - –Average number of medicines prescribed per patient encounter
 - –% medicines prescribed by generic name
 - –% encounters with an antibiotic prescribed
 - –% encounters with an injection prescribed
 - –% medicines prescribed from essential medicines list or formulary

Prescribing Quality Indicators

A measurable element of prescribing for which there is evidence or consensus that it can be used to assess quality of prescribing, and hence change the quality of care provided (EuroDURG Quality Indicator Meeting, 2004)

Why measure prescribing quality?

- Identification of sub-optimal care
- Monitoring change or assessing the outcome of interventions
- Identification of sub-optimal prescribers
 - education
 - accountability
 - Regulation
 - Remuneration

Porr et al. European Journal of Clinical Pharmacology, 2004

What aspects of prescribing can be measured

- **Step 1** Define the patient's problem.
- **Step 2** Specify the therapeutic objective. What do you want to achieve with the treatment, based on the problem and the patient's needs?
- **Step 3** Define therapeutic options: Which treatment is indicated (including **decision to prescribe**)? What is the most effective, safe, suitable and cheap treatment for this objective (**medication choice in general**)?
- **Step 4** Verify the suitability of first-line treatment. Check effectiveness and safety in this specific case (**patient-oriented choice**).
- **Step 5** Start the treatment. Give information, instructions and warnings.
- **Step 6** Monitor treatment (**evaluate, adjust, discontinue treatment**).

Adapted from:
WHO Guide to
good prescribing

Quality Use of Medicines



Quality Use of Medicines

- Selecting management options wisely;
- Choosing suitable medicines if a medicine is considered necessary;
- Using medicines safely and effectively.

Figure 1: QUM and the National Medicines Policy



[https://www.health.gov.au/internet/main/publishing.nsf/Content/FE45B3A04A63F18CA2578F002104E106/\\$?file/National%20Strategy%20for%20Quality%20Use%20of%20Medicines%20Executive%20Summary%20Brochure.pdf](https://www.health.gov.au/internet/main/publishing.nsf/Content/FE45B3A04A63F18CA2578F002104E106/$?file/National%20Strategy%20for%20Quality%20Use%20of%20Medicines%20Executive%20Summary%20Brochure.pdf)

What aspects of prescribing can be measured?

- Decision to prescribe medication
- Choice of medication
- Dosing regimen
- duration of treatment
- Monitoring, including adjustment or discontinuation

Types of indicators

- Process, Structure and Outcome
- Explicit or Implicit
- Drug oriented, disease oriented or sequential



Donabedian A, Wheeler JR, Wyszowski L. Quality, cost, and health: an integrative model. Med Care. 1982 Oct;20(10):975-92.

Structure Indicators

- Organizational factors that define the health system
 - Resources
 - Management
 - Facilities
- Example: *Cost of generic prescribing/Cost all prescribing*

Process Indicators

- The quality of the care provided
- Most prescribing indicators measure process
 - Example: *Number of patients provided with information regarding their medicines/ all patients prescribed a medicine*

Outcome indicators

- - Focus on the outcome of the care provided
 - Does better prescribing result in better health outcomes
 - Very few prescribing outcome indicators
 - Difficult to measure
 - Influenced by structure and process

Implicit indicators

- - Require expert clinical judgement
 - Not drug or disease focussed
 - Time consuming and resource intensive
 - Applied at the individual patient level

Table IV. The Medication Appropriateness Index (reprinted from Hanlon et al.¹⁰⁸ Copyright 1992, with permission from Elsevier)

Criterion	Weighted score
Is there an indication for the drug?	3
Is the medication effective for the condition?	3
Is the dosage correct?	2
Are the directions correct?	2
Are the directions practical?	1
Are there clinically significant drug-drug interactions?	2
Are there clinically significant drug-disease interactions?	2
Is there unnecessary duplication with other drugs?	1
Is the duration of therapy acceptable?	1
Is this drug the least expensive alternative compared to others of equal utility?	1
Total	18

Explicit criteria

- - Lists of drugs or drug classes and dosages known to cause harm
 - Can be applied to prescriptions with little or no clinical judgement.
 - Generally focus on a single drug or condition
 - Drug oriented indicators
 - Disease oriented indicators

Drug Oriented indicators

- - based on drug utilization patterns
 - Do not need data on indication or other patient characteristics
 - Sales data, dispensing data , prescribing data
 - Measure prescribing for the "average patient"
 - Do not generally consider multimorbidity and often do not consider co-medications

Drug oriented indicators

- **Prescription-level**
- **Preferred drugs within therapeutic class:**
 - % simvastatin / all statin units (people Rx or DDDs)
- **Dosing**
 - % high dosed hydrochlorothiazides/ all HCT
- **Patient-level**
- **First choice treatment**
 - % first prescriptions for metformin/ all OAD starts
 - % All-antagonists after ACE-I / all All-antagonist users
- **Avoid inappropriate treatment**
 - % on longacting SU-derivatives/ all SU-derivatives

ORIGINAL ARTICLE

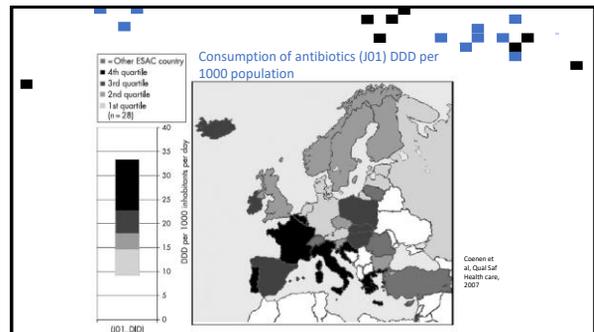
European Surveillance of Antimicrobial Consumption (ESAC): quality indicators for outpatient antibiotic use in Europe

Samuel Coenen, Matus Ferenc, Flora M Hazler-Raukamp, Chris C Butler, Robert H Vander Stichele, Theo J M Verheij, Dominique L Monnet, Paul Little, Herman Goossens, the ESAC Project Group

Qual Saf Health Care 2007;16:e40-443. doi: 10.1136/qshc.2006.021121

Label	Description
(1) J01_DDD	Consumption of antibacterials for systemic use (J01) expressed in DDD
(2) J01A_DDD	Consumption of tetracyclines (J01A) expressed in DDD
(3) J01C_DDD	Consumption of penicillins (J01C) expressed in DDD
(4) J01D_DDD	Consumption of cephalosporins (J01D) expressed in DDD
(5) J01E_DDD	Consumption of sulfonamides and trimethoprim (J01E) expressed in DDD
(6) J01F_DDD	Consumption of macrolides, lincosamides and streptogramins (J01F) expressed in DDD
(7) J01M_DDD	Consumption of quinolones (J01M) expressed in DDD
(8) J01A_%	Consumption of tetracyclines (J01A) expressed as percentage
(9) J01C_%	Consumption of penicillins (J01C) expressed as percentage
(10) J01D_%	Consumption of cephalosporins (J01D) expressed as percentage
(11) J01E_%	Consumption of sulfonamides and trimethoprim (J01E) expressed as percentage
(12) J01F_%	Consumption of macrolides, lincosamides and streptogramins (J01F) expressed as percentage
(13) J01M_%	Consumption of quinolones (J01M) expressed as percentage
(14) J01CE_%	Consumption of β -lactamase sensitive penicillins (J01CE) expressed as percentage
(15) J01CR_%	Consumption of combination of penicillins, including β -lactamase inhibitor (J01CR) expressed as percentage
(16) J01DD+DE_%	Consumption of third and fourth generation cephalosporins (J01DD+DE) expressed as percentage
(17) J01MA_%	Consumption of fluoroquinolones (J01MA) expressed as percentage
(18) J01B/NH	Ratio of the consumption of broad [J01CR+DC+DD+FF+FA01] to the consumption of narrow spectrum penicillins, cephalosporins and macrolides (J01CE+DB+FA01)
(19) J01_SV1	Seasonal variation of the total antibiotic consumption (J01)
(20) J01M_SV1	Seasonal variation of quinolone consumption (J01M)
(21) J01M_SVDI	Seasonal variation of quinolone consumption (J01M) multiplied by their use in DDD
(22) J01_TT	Index of longitudinal trends of antibiotic consumption

Coenen et al. Qual Saf Health Care, 2007



Disease specific indicators

- Prescribing in relation to the condition for which a drug is being prescribed.
- Need patient level data including diagnosis/indication
 - Health records,
 - Dispensing with indication

Disease oriented indicators

- **Underprescribing**
 - % diabetes patients treated with statins
 - % beta-blockers in patients with myocardial infarction
- **Overprescribing**
 - % patients prescribed an antibiotic for a non-specific upper respiratory tract infection
- **Safety**
 - % patients with diabetes & heart failure prescribed thiazolidinediones

Original research

European Surveillance of Antimicrobial Consumption (ESAC): disease-specific quality indicators for outpatient antibiotic prescribing

Niels Adriaenssens,^{1,2} Samuel Coenen,^{1,2} Sarah Tonkin-Crine,³ Theo J M Verheij,⁴ Paul Little,² Herman Goossens,¹ on behalf of the ESAC Project Group

BMJ Qual Saf 2011

Table 1 List of proposed disease specific antibiotic prescribing quality indicators in Europe

No.	Title	Label	Acceptable range (%)
1a	Percentage of patients aged between 18 and 75 years with acute bronchitis/bronchitis (CPC-2-R: R78) prescribed antibiotics for systemic use (ATC: J01)	(R78_J01_%)	0-50
1b	-Is prescribing the recommended antibiotics (ATC: J01CA or J01AA)	(R78_RECUM_%)	80-100
1c	-Is receiving quinolones (ATC: J01M)	(R78_J01M_%)	0-5
2a	Percentage of patients older than 1 year with acute upper respiratory infection (CPC-2-R: R74) prescribed antibiotics for systemic use (ATC: J01)	(R74_J01_%)	0-20
2b	-Is prescribing the recommended antibiotics (ATC: J01CE)	(R74_RECUM_%)	80-100
2c	-Is receiving quinolones (ATC: J01M)	(R74_J01M_%)	0-5
2d	Percentage of female patients older than 18 years with cystitis (other urinary infection (CPC-2-R: J21)) prescribed antibiotics for systemic use (ATC: J01)	(J21_J01_%)	80-100
3a	-Is prescribing the recommended antibiotics (ATC: J01XE or J01EA or J01CC)	(J21_RECUM_%)	80-100
3b	-Is receiving quinolones (ATC: J01M)	(J21_J01M_%)	0-5
4a	Percentage of patients older than 1 year with acute tonsillitis (CPC-2-R: R76) prescribed antibiotics for systemic use (ATC: J01)	(R76_J01_%)	0-20
4b	-Is prescribing the recommended antibiotics (ATC: J01CE)	(R76_RECUM_%)	80-100
4c	-Is receiving quinolones (ATC: J01M)	(R76_J01M_%)	0-5
5a	Percentage of patients older than 18 years with acute otitis media (CPC-2-R: R75) prescribed antibiotics for systemic use (ATC: J01)	(R75_J01_%)	0-20
5b	-Is prescribing the recommended antibiotics (ATC: J01CA or J01CE)	(R75_RECUM_%)	80-100
5c	-Is receiving quinolones (ATC: J01M)	(R75_J01M_%)	0-5
6a	Percentage of patients older than 2 years with acute otitis media/myringitis (CPC-2-R: H71) prescribed antibiotics for systemic use (ATC: J01)	(H71_J01_%)	0-20
6b	-Is prescribing the recommended antibiotics (ATC: J01CA or J01CE)	(H71_RECUM_%)	80-100
6c	-Is receiving quinolones (ATC: J01M)	(H71_J01M_%)	0-5
7a	Percentage of patients aged between 18 and 65 years with pneumonia (CPC-2-R: R81) prescribed antibiotics for systemic use (ATC: J01)	(R81_J01_%)	80-100
7b	-Is prescribing the recommended antibiotics (ATC: J01CA or J01AA)	(R81_RECUM_%)	80-100
7c	-Is receiving quinolones (ATC: J01M)	(R81_J01M_%)	0-5

Adriaenssens et al
BMJ Qual Saf 2011

Disease oriented: Sequential indicator

- Treatment linked to disease-event
- Need longitudinal individual patient level data
 - ACOVE (assessing care of vulnerable elders), e.g.
 - 'IF a diabetic has an elevated HbA1c, THEN an intervention should occur within 3 months'
 - "tightly linked" action indicators, e.g.
 - 'start or intensify treatment for patients having an LDL-cholesterol>3.4 mmol/l'

Developing prescribing indicators

- - Defining quality
 - Measuring quality
 - Feasibility
 - Validation

Activity 2

- - How can we define "good quality prescribing"
 - Consider the strengths and weaknesses of ways to define "good prescribing"

Methods for defining quality

Method	Strengths	Weaknesses

Measuring quality

- Generally rates, ratios or percentages



Figure 13.2 Illustration of an indicator constructed as a ratio between a recommended drug and its non-recommended alternatives

Image from: Drug Utilization Research: Methods and Applications

Feasibility

- Need to pilot before use
 - Is the data available?
 - Is the data reliable?
 - Are the results reproducible?

Validity

- Face
- Content
- Predictive

Face validity

- Does the indicator appear to measure quality
 - Expert opinion
 - Expert consensus
 - Delphi/ RAND



Face Validity

Prescribing indicators for UK general practice:
Delphi consultation study

Stephen M Cammishell, Judy A Cantrill, Dave Roberts
 BMJ VOLUME 321 12 AUGUST 2000 bmj.com

Participants and methods

A list of 31 prescribing indicators was generated from on two main sources: prescribing indicators with evidence of face validity in a previous Delphi consultation¹ and, most importantly, prescribing indicators used at the time of the survey by the Prescribing Support Unit.²

Example indicator format in round 2 questionnaire
showing the three different types of feedback

	Cost minimisation	Quality
Antibiotic generic prescribing rate (%)	49 28 32 22 11 5 4 1 2 9 8 7 6 5 4 3 2 1	7 19 12 26 27 15 15 10 16 9 8 7 6 5 4 3 2 1

Summary of comments:

Some comments advocated a high %—for example, 'high generic prescribers are sometimes those using the older established antibiotics more than the new high cost ones.' Other comments focused on why a high % may not be appropriate—for example, 'expensive 2nd and 3rd line drugs are often prescribed generically but inappropriately.'

Example of feedback on indicators included in second round questionnaire

Content validity

- Does the indicator actually measure quality.
 - Evidence-base
 - Guidelines or research
 - Expert consensus



Content validity

- Step 1. Under-treatment of short-acting inhaled β -agonists for all asthma patients
- Step 2. Under-treatment of inhaled corticosteroids for mild, moderate or severe persistent asthma
- Step 3. Inadequate dose of inhaled corticosteroids for moderate or severe persistent asthma
- Step 4. Under-treatment of inhaled long-acting β -agonists for severe persistent asthma

Poort et al, Eur J Clin Pharmacol 2004

Content validity

Table 1 Severity classification criteria and pharmacotherapy recommendations from the 1997 National Institutes of Health asthma guidelines. FEV₁: forced expiratory volume at one second; PEF: peak expiratory flow.

Asthma severity class	Criteria for classifying asthma severity*	Main pharmacotherapy recommendations
Class 1. Mild intermittent	Symptoms two times a week or less. Asymptomatic and normal PEF between exacerbations. Exacerbations brief. Nighttime symptoms two times a month or less. Lung function: FEV ₁ or PEF ≥ 80% predicted.	Short-acting inhaled β ₂ -agonist as needed.
Class 2. Mild persistent	Symptoms > two times a week but < once a day. Exacerbations may affect activity. Nighttime symptoms ≥ two times a month. Lung function: FEV ₁ or PEF ≥ 80% predicted.	Short-acting inhaled β ₂ -agonist as needed and low-dose inhaled corticosteroid
Class 3. Moderate persistent	Symptoms daily. Daily inhaled short-acting β ₂ -agonist use. Exacerbation affect activity. Exacerbations two times a week or more. Nighttime symptoms ≥ once a week. Lung function: FEV ₁ or PEF > 60% and < 80% predicted.	Short-acting inhaled β ₂ -agonist as needed and medium-dose inhaled corticosteroid or low-dose inhaled corticosteroid and inhaled long-acting β ₂ -agonist
Class 4. Severe persistent	Symptoms continual. Limited physical activity. Frequent exacerbations. Nighttime symptoms frequent. Lung function: FEV ₁ or PEF 60% predicted or less.	Short-acting inhaled β ₂ -agonist as needed and high-dose inhaled corticosteroid and inhaled long-acting β ₂ -agonist and/or oral corticosteroid

Point et al, Eur J Clin Pharmacol 2004

Validity of prescribing indicators for assessing quality of antibiotic use in Australian general practice

Lisa G. Pont¹, Tessa K. Morgan², Margaret Williamson³, Flora M. Haajzer⁴ and Mieke L. van Driel⁵

¹Centre for Health Systems and Safety Research, Australian Institute of Health Innovation, Macquarie University, North Ryde, NSW, Australia; ²Sydney, NSW, Australia; ³University of Stirling, Stirling, The Netherlands; and ⁴University of Queensland, Brisbane, QLD, Australia

Diagnostic indicator	Validity for monitoring antibiotic resistance	Validity for monitoring benefit to individual patients	Validity for monitoring value for money	Validity for priority setting
1. Consumption of all antibiotics for systemic use	7 (1.5)	4 (1.9)	7 (26.8)	6 (5.5)
2. Consumption of penicillins	7 (9.5)	7 (16.6)	8 (40.6)	8 (16.6)
3. Consumption of cephalosporins	7 (2.4)	7 (3.8)	8 (1.5)	8 (3.2)
4. Consumption of macrolides	8 (2.7)	7 (4.8)	7 (1.5)	8 (1.4)
5. Consumption of quinolones	8 (2.4)	6 (2.5)	7 (1.5)	8 (1.4)
6. Consumption of combination penicillins	7 (4.1)	6 (1.9)	7 (2.6)	7 (6.1)
7. Consumption of third- and fourth-generation cephalosporins	8 (6.1)	7 (2.4)	7 (2.1)	8 (6.5)
8. Consumption of aminoglycosides	8 (4.1)	6 (1.9)	8 (1.5)	8 (1.4)
9. Ratio broad-spectrum to narrow-spectrum antibiotics	7 (1.4)	7 (1.5)	8 (1.4)	7 (6.1)
10. Consumption of antibiotics commonly used for upper respiratory tract infections (ARTIs)	7 (1.5)	7 (1.5)	7 (1.5)	7 (4.8)

Antibiotics are indicated for acute cystitis. There is no value in monitoring their use in terms of quality of prescribing. Monitoring which ones are used would be of value, GP 4

Not sure how relevant this is, as it is common practice to give antibiotics for urinary tract infection, the type and duration of treatment much more relevant, GP 1

- ### Concurrent validity
- Comparison to a gold standard
 - Agreement with existing indicators
 - Clinician review
 - Resource intensive

Concurrent validity

Table 4: Correlation Among Indicators Concerning Maintenance Treatment and Among Indicators Concerning Exacerbation Treatment (Spearman's Rho)

		Inhaled Corticosteroids Ratio	Continuous Use	Low Corticosteroids	Oral Corticosteroid
Maintenance	Self-report				
	Competence-1	0.211*	0.160	-0.158	-0.172*
	Written cases-1	0.152	0.074	-0.066	0.169
Aggregated	Ratio	0.389**	-0.202*	-0.366**	
	Inhaled corticosteroids		-0.553**	-0.069	
Individualized	Continuous use			-0.009	
Exacerbation	Self-report				
	Competence-2				0.177*
	Written cases-2				0.211*

*Significant: p < .05, two-tailed test; **significant: p < .01, two-tailed test.

Veenings, et al. Health Services Research 2001

Eur J Clin Pharmacol (2002) 57: 819-825
DOI 10.1007/s00228-001-0394-4

PHARMACOEPIDEMOLOGY AND PRESCRIPTION

Lisa G. Post · Petra Denig · Thys van der Werf
Willem Jan van der Veen · Flora M. Haaijze-Ruskamp

Validity of performance indicators for assessing prescribing quality: the case of asthma

Validation process

We validated indicators that targeted sub-optimal treatment patterns related to four steps included in the 1997 National Institutes of Health (NIH) guidelines [12].

Step 1. Under-treatment of short-acting inhaled β₂-agonists for all asthma patients

Step 2. Under-treatment of inhaled corticosteroids for mild, moderate or severe persistent asthma

Step 3. Inadequate dose of inhaled corticosteroids for moderate or severe persistent asthma

Step 4. Under-treatment of inhaled long-acting β₂-agonists for severe persistent asthma

Indicator	Relevant asthma severity classes, grouped by each indicator (number of patients)	Sensitivity	Positive predictive value
Step 1 indicator	All severity classes (n = 146)	0.86 (0.71-0.95)	0.52 (0.38-0.65)
Step 2A indicator	Severity classes 2, 3 & 4 (n = 95)	0.74 (0.57-0.85)	0.46 (0.31-0.60)
Step 2B indicator	Severity classes 2, 3 & 4 (n = 95)	0.77 (0.59-0.89)	0.71 (0.42-0.92)
Step 3 indicator	Severity classes 3 & 4 (n = 86)	0.07 (0.00-0.25)	0.20 (0.00-0.72)
Step 4 indicator	Severity class 4 (n = 16)	Not validated due to inadequate sample size	

Eur J Clin Pharmacol (2002) 57: 819-825
DOI 10.1007/s00228-001-0394-4

PHARMACOEPIDEMOLOGY AND PRESCRIPTION

Lisa G. Post · G.Th. van der Werf
P. Denig · F.M. Haaijze-Ruskamp

Identifying general practice patients diagnosed with asthma and their exacerbation episodes from prescribing data

Table 3 Sensitivity, specificity and predictive values for criteria to identify asthma exacerbation from prescribing data (95% confidence intervals in parentheses)

Asthma exacerbation identification criteria	Sensitivity (95% CI)	Specificity (95% CI)	Positive predictive value (95% CI)	Negative predictive value (95% CI)
Short-course oral corticosteroid	0.25 (0.20-0.28)	0.99 (0.99-0.99)	0.67 (0.59-0.75)	0.93 (0.92-0.94)
Short-course oral corticosteroid or short-course antibiotic	0.51 (0.50-0.60)	0.96 (0.96-0.97)	0.58 (0.53-0.63)	0.95 (0.95-0.96)

Predictive validity

- Does the indicator actually result in better health outcomes
 - Difficult to measure
 - Requires high level data and health outcomes

Predictive validity

Study (sample)	HbA1c	Blood pressure	Cholesterol
Sperl-Hillen 2005 * (5610 patients)	+		+
Berlowitz et al. 2005 * (23,291 patients)	+		
Selby et al. 2009 * (35 facilities, ~250-8500 patients per facility)	+	+	+
Ziemer et al. 2005 (12 providers, 2341 patients)	+		
V Bruggen et al. 2009 (161/701/686 patients)	-	-	+

Sidorenkov G, et al. Med Care Res Rev. 2011;68:263-89

Validity within context of use

- Health system
- Local guidelines and formulary
- Prescribers
 - Health workers, doctors, nurses

Validity within the context of use

ORIGINAL ARTICLE

European Surveillance of Antimicrobial Consumption (ESAC): quality indicators for outpatient antibiotic use in Europe

Samuel Coenen, Mathus Ferech, Flora M Haaijer-Ruskamp, Chris C Butler, Robert H Vander Stichele, Theo J M Verheij, Dominique L Monnet, Paul Little, Herman Goossens, the ESAC Project Group

Qual Saf Health Care 2007;16:e440-445. doi: 10.1136/qhc.2006.021123

Were the ESAC antimicrobial indicators valid for use in Australian general practice????

Validity within the context of use

IJPP
International Journal of
Pharmacy Practice

Research Paper

Validity of prescribing indicators for assessing quality of antibiotic use in Australian general practice

Lisa G. Porte^a, Tessa K. Morgan^b, Margaret Williamson^a, Flora M. Haaijer^c and Mieke L. van Driel^d

Conclusions This study demonstrates the validity of 30 European indicators for assessing quality of antimicrobial prescribing in general practice in a non-European setting and provides guidance regarding acceptable benchmarks for the indicators. With international concerns regarding misuse of antibiotics and global interest in prescribing quality, valid evidence-based antimicrobial prescribing indicators and associated benchmarks are an essential tool for assessing prescribing quality.

Porte et al. IJPP, 2017

Validity relevant to purpose of use

Validity may also be dependent on purpose of use:

- Screening tool
- Reimbursement or punitive action
- Resource allocation for education

Indicator	Relevant asthma severity classes targeted by each indicator (number of patients)	Sensitivity	Positive predictive value
Step-1 indicator	All severity classes (n = 146)	0.86 (0.71-0.95)	0.52 (0.38-0.65)
Step-2A indicator	Severity classes 2, 3 & 4 (n = 95)	0.74 (0.57-0.88)	0.46 (0.33-0.60)
Step-2B indicator	Severity classes 2, 3 & 4 (n = 95)	0.37 (0.19-0.55)	0.71 (0.42-0.92)
Step-3 indicator	Severity classes 3 & 4 (n = 86)	0.07 (0.00-0.32)	0.20 (0.00-0.72)
Step-4 indicator	Severity class 4 (n = 16)	Not validated due to inadequate sample size	

Porte et al. Eur J Clin Pharmacol 2004

Attributes of prescribing indicators

- - Evidence-based
 - Valid
 - Internal and external
 - Face, content, concurrent and ideally predictive
 - Is the sensitivity and specificity known?

Session 2

- - Designing and testing indicators

Steps in Indicator development and implementation

- 1. Need for new indicator
 - Indication of a potential problem
 - Review of literature for existing indicators
 2. Indicator development
 1. Available data sources
 2. Identification of "good quality prescribing"

Steps in Indicator Development and implementation

- 3. Assessment of Validity
 1. Internal/ external
 2. Face/Content/ concurrent/Predictive
 4. Feasibility and acceptability
 1. Practicality
 2. Clarify and interpretation
 3. Acceptability to prescribers

Steps in indicator development and implementation

5. Implementation

- Revision
- Timing
- Potential barriers
- Unintended consequences/ gaming the system

In your region there are concerns that drug therapy for management of respiratory disease may be sub-optimal and the Minister of Health has asked you to develop a set of indicators for prescribing to monitor the quality of prescribing. You have been asked to present your plan to the Minister of Health.

• In your plan consider:

- What areas of respiratory disease will you focus on?
- How will you identify good quality prescribing?
- What data sources are available in your region?
- What methods of development will you use?
- How will you determine the validity of the indicators?
- How often should the indicators be used?



Thank you

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