The Global Point Prevalence Survey of Antimicrobial Consumption and Resistance in 335 Hospitals Worldwide

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bioMérieux is the sole sponsor of the GLOBAL-PPS. The funder has no role in study design, data collection, data analysis, data interpretation, or writing the report. Data are strictly confidential and stored anonymous at the coordinating centre of the University of Antwerp.”
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Overall Results
- Degree of participation
- Antimicrobial prevalence rates worldwide
- Antibiotic therapeutic prescribing (%)
- Antibiotic quality indicators
- Targeted treatment against resistant organisms

Results for Iran and East & South Asia
Discussion
Global-PPS Aims

• Monitor rates of antimicrobial prescribing in hospitalized adults, children and neonates.
• Determine the variation in drug, dose and indications of antimicrobial prescribing across continents.
• Identify targets to improve quality of antimicrobial prescribing.
• Help designing hospital interventions to promote prudent antimicrobial use.
• Increase public health capacity.
Methods

• Any hospital welcome to join the Global-PPS network.
• Data-collection : February-June 2015
• All wards of the hospital were included “once”
• Denominator collected at ward level
  ✓ N patients admitted
  ✓ N available beds
Essential data to collect: numerator

For each patient receiving an antimicrobial:
- age, gender and weight

For each antimicrobial prescription:
- Antimicrobial agent/s (substance level) with dose per administration - N doses/day - route of administration
- Reasons for treatment: what the clinician tends to treat
- Indication for therapy (CAI, HAI; Medical/Surgical Prophylaxis)
- Extra quality indicators:
  - Reason of prescription written in notes
  - Stop or review date written in notes
  - Prescription compliant with local guidelines
- Treatment based on biomarker and which one
- Microbiology data (if targeted treatment)
Worldwide RESULTS
Degree of participation

N = 53 C (countries)
N = 335 H (hospitals)
Collected and recorded data

100,166 admitted inpatients
34,726 patients treated with at least one antimicrobial

48,565 antimicrobial prescriptions

- 43,513 (89.6%) antibacterials for systemic use (ATC J01)
- 2,062 (4.3%) antimycotics for systemic use (ATC J02)
- 1,137 (2.3%) drugs to treat tuberculosis (ATC J04)
- 932 (1.9%) nitroimidazole derivatives (ATC code P01AB)
- 781 (1.6%) intestinal anti-infectives (ATC code A07)
- 126 (0.3%) neuraminidase inhibitors (ATC code J05AH)
Mean antimicrobial prevalence rates (%) by UN-region (country-ranges)

Worldwide mean AM prevalence rate = 34.7%
### Top 10 most prescribed antibiotics (ATC J01) for therapeutic use, by UN region

<table>
<thead>
<tr>
<th>Antimicrobial name</th>
<th>N antibiotics (ATC J01)</th>
<th>North Europe % (n=3441)</th>
<th>East Europe % (n=651)</th>
<th>South Europe % (n=4909)</th>
<th>West Europe % (n=8074)</th>
<th>Africa % (n=1366)</th>
<th>Australia &amp; New Zealand % (n=1021)</th>
<th>East &amp; South Asia % (n=4785)</th>
<th>West &amp; Central Asia % (n=2088)</th>
<th>North America % (n=2392)</th>
<th>South America % (n=1964)</th>
<th>All Regions % (n=30691)</th>
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<tbody>
<tr>
<td>Amoxicillin/enzyme inhibitor</td>
<td>13.4</td>
<td>8.6</td>
<td>6.3</td>
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*Bold*=proportional use >5%

Overview of antibiotic prescribing rates for prophylactic use are provided in 2016 ECCMID-poster n° P1222 available at [www.global-pps.be/dissemination](http://www.global-pps.be/dissemination)
Antibiotic (ATC J01) quality indicators for therapeutic use

<table>
<thead>
<tr>
<th>Antibiotic quality indicators (N antibiotics for CAI and HAI)</th>
<th>No guidelines %</th>
<th>guideline compliant %</th>
<th>Reason in notes %</th>
<th>Stop review date documented %</th>
<th>Parenteral RoA %</th>
<th>Targeted treatment %</th>
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<tr>
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<td>All Regions (n=30691)</td>
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<td>85.5</td>
<td>38.0</td>
<td>75.9</td>
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</table>

Antibiotic prevalence rates (%) for a CAI versus HAI by UN region

Mean CAI = 46.6%
Mean HAI = 22.1%

Includes only systemic antibiotics for therapeutic use
Numerator=N patients with CAI/HAI
Denominator=All treated patients
Antibiotic treatment based on microbiology data
RESULTS for Iran compared to East-South Asia and Europe
Participation to the 2015 Global-PPS according to UN macro-geographical subregions

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of countries</th>
<th>Number of hospitals</th>
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<td>North America</td>
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<td>Africa</td>
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<td>North Europe</td>
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<tr>
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<tr>
<td>East &amp; South Asia</td>
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<td>29</td>
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<tr>
<td>Australia &amp; New Zealand</td>
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</table>
### Overall antimicrobial prevalence by region and type of adult ward

<table>
<thead>
<tr>
<th>Region</th>
<th>Total</th>
<th>AMW</th>
<th>HO-AMW</th>
<th>T-AMW</th>
<th>P-AMW</th>
<th>ASW</th>
<th>AICU</th>
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<tbody>
<tr>
<td>North America</td>
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<td>South America</td>
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<tr>
<td>North Europe</td>
<td>34.4</td>
<td>29.8</td>
<td>49.6</td>
<td>60.8</td>
<td>53.5</td>
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<td>West Europe</td>
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<td>South Europe</td>
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<td>76.9</td>
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<tr>
<td>West &amp; Central Asia</td>
<td>43.7</td>
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<td>48.1</td>
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<td>100.0</td>
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<td>46.6</td>
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<td>East &amp; South Asia</td>
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<td>Australia &amp; New Zealand</td>
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<td><strong>Our hospital</strong></td>
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<td>81.6</td>
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</table>

Antimicrobial prevalence (%): 100*(number of treated patients/number of registered patients according to UN macro-geographical subregions).

Total = Overall antimicrobial prevalence in adult wards; AMW = Adult Medical Ward; HO-AMW = Haematology-Oncology AMW; T-AMW = Transplant (BMT/solid) AMW; P-AMW = Pneumology AMW; ASW = Adult Surgical Ward; AICU = Adult Intensive Care Unit.
Overall proportional antibiotic use

**Hosp 1** (N= 256 treated patients)

- Tetracyclines: 36.4%
- Penicillins: 9.8%
- Other beta-lactams: 7.2%
- Other antibiotics: 4.5%
- Sulfonamides and Trimethoprim: 8.7%
- Aminoglycosides: 24.6%
- Quinolones: 6.8%
- Macrolides, Lincosamides and Streptogramins: 6.8%
- East & South Asia: 6.8%

**Hosp 2** (N= 198 treated patients)

- Tetracyclines: 58.2%
- Penicillins: 6.9%
- Other beta-lactams: 8.2%
- Other antibiotics: 4.6%
- Sulfonamides and Trimethoprim: 6.9%
- Aminoglycosides: 12.5%
- Quinolones: 9.2%
- Macrolides, Lincosamides and Streptogramins: 4.6%

**Iran** (n= 4 hospitals)

- Tetracyclines: 47.9%
- Penicillins: 8.4%
- Other beta-lactams: 5.3%
- Other antibiotics: 8.4%
- Sulfonamides and Trimethoprim: 5.3%
- Aminoglycosides: 16.7%
- Quinolones: 0.6%
- Macrolides, Lincosamides and Streptogramins: 8.2%

**East & South Asia** (n= 29 hospitals)

- Tetracyclines: 39.6%
- Penicillins: 7.5%
- Other beta-lactams: 10.7%
- Other antibiotics: 11.1%
- Sulfonamides and Trimethoprim: 5.5%
- Aminoglycosides: 2.4%
- Quinolones: 21.7%
- Macrolides, Lincosamides and Streptogramins: 1.4%

**East & South Asia - tertiary** (n= 17 hospitals)

- Tetracyclines: 39.3%
- Penicillins: 6.6%
- Other beta-lactams: 5.6%
- Other antibiotics: 6.6%
- Sulfonamides and Trimethoprim: 2.5%
- Aminoglycosides: 11.8%
- Quinolones: 1.4%
- Macrolides, Lincosamides and Streptogramins: 21.1%

**Europe (N= 213 hospitals)**

- Tetracyclines: 30.1%
- Penicillins: 3.7%
- Other beta-lactams: 5.6%
- Other antibiotics: 5.1%
- Sulfonamides and Trimethoprim: 5.1%
- Aminoglycosides: 11.2%
- Quinolones: 10.5%
- Macrolides, Lincosamides and Streptogramins: 16.0%
Proportional use of beta-lactam antibiotics

Hosp 1 (N=30 treated patients)
- Penicillins with extended spectrum: 68.8%
- Beta-lactamase resistant penicillins: 25%
- Beta-lactamase sensitive penicillins: 6.2%

Hosp 2 (N=38 treated patients)
- Penicillins with extended spectrum: 86.8%
- Beta-lactamase resistant penicillins: 5.3%
- Beta-lactamase sensitive penicillins: 7.9%

Iran (n=4 hospitals)
- Penicillins with extended spectrum: 56.5%
- Beta-lactamase resistant penicillins: 29.4%
- Beta-lactamase sensitive penicillins: 11.8%
- Combinations of penicillins, incl. beta-lactamase inhibitors: 2.4%

East & South Asia (n=29 hospitals)
- Penicillins with extended spectrum: 78.3%
- Beta-lactamase resistant penicillins: 15.1%
- Beta-lactamase sensitive penicillins: 3.3%
- Combinations of penicillins, incl. beta-lactamase inhibitors: 2.3%

East & South Asia - tertiary (n=17 hospitals)
- Penicillins with extended spectrum: 80.6%
- Beta-lactamase resistant penicillins: 12.8%
- Beta-lactamase sensitive penicillins: 3.0%
- Combinations of penicillins, incl. beta-lactamase inhibitors: 2.7%

Europe (N=200 hospitals)
- Penicillins with extended spectrum: 70.6%
- Beta-lactamase resistant penicillins: 18.5%
- Beta-lactamase sensitive penicillins: 6.5%
- Combinations of penicillins, incl. beta-lactamase inhibitors: 4.3%
Proportional use of other beta-lactam antibacterials

Hosp 1 (N= 174 treated patients)

Hosp 2 (N= 170 treated patients)

Iran (n= 4 hospitals)

East & South Asia (n= 29 hospitals)

East & South Asia - tertiary (n= 17 hospitals)

Europe (N= 199 hospitals)

Legend:
- Green: First-generation cephalosporins
- Blue: Fourth-generation cephalosporins
- Yellow: Second-generation cephalosporins
- Purple: Carbapenems
- Red: Third-generation cephalosporins
10 most common diagnoses treated with therapeutic antimicrobials

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Hosp 1 N</th>
<th>%</th>
<th>Hosp 2 N</th>
<th>%</th>
<th>Iran N</th>
<th>%</th>
<th>Iran N</th>
<th>%</th>
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CNS=Infection of central nervous system; Eye=eye infections; ENT=ear, nose and throat infections; URTI=upper respiratory tract infection; Bron=bronchitis; Pneu=Pneumonia or lower respiratory tract infection; TB=tuberculosis; CVS=cardiovascular system infections; GI=gastro-intestinal infections; IA=intra-abdominal sepsis; SST=skin and soft tissue; BJ=bone/joint infections; CNS=lower urinary tract infection; Pye=Upper urinary tract infection; OBGY=obstetric/gynaecological infections; GUM=genito-urinary males; BAC=bacteraemia; PUO=pyrexia of unknown origin; PUO-HO=fever syndrome in non-neutropaenic haematology-oncology patient; FN=fever neutropaenic patient; LYM=lymph
### Summary of quality indicators for antibiotic use

<table>
<thead>
<tr>
<th></th>
<th>Hosp 1</th>
<th>Hosp 2</th>
<th>Iran</th>
<th>East &amp; South Asia</th>
<th>East &amp; South Asia - tertiary</th>
<th>Europe</th>
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<tr>
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<td>148 57.4</td>
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</table>

Antibiotic quality indicators by activity (medical, surgery, ICU) for all patients receiving antibacterials for systemic use (ATC J01).
- For reason in notes and stop/review date documented: Count at antibacterial level.
- For guidelines missing: Count on NA (= no local guidelines for the specific indication) at patient level and diagnosis over total scores for this indicator.
- For guideline compliance: Count at patient level and diagnosis for compliance = yes or no only. For combination therapy with >1 antibiotic: if 1 antibiotic by diagnosis is not compliant, this combination therapy as a whole for this diagnosis will be counted as non-compliant.
Top 5 most frequently used antibiotics for sepsis in adults and children

Hosp 1
- Amoxicillin and enzyme inhibitor
- Piperacillin and enzyme inhibitor
- Ceftriaxone
- Teicoplanin
- Imipenem and enzyme inhibitor
- Ciprofloxacin
- Vancomycin Parenteral
- Meropenem

Hosp 2
- Amoxicillin and enzyme inhibitor
- Piperacillin and enzyme inhibitor
- Teicoplanin
- Ciprofloxacin
- Vancomycin Parenteral
- Meropenem
- Ceftriaxone

Iran
- Hosp 1 (N = 35 patients)
- Hosp 2 (N = 3 patients)
- Continent (N = 42 patients in 4 hospitals)
- Hospital type (N = 170 patients in 23 hospitals)
- Europe (N = 153 patients in 17 hospitals)
- Asia (N = 485 patients in 124 hospitals)
Top 5 most frequently used antibiotics for pneumonia in adults and children

Hosp 1
- Clarithromycin
- Amoxicillin
- Levofloxacin
- Amoxicillin and enzyme inhibitor
- Piperacillin and enzyme inhibitor
- Ciprofloxacin
- Azithromycin
- Clindamycin
- Cefotaxime
- Vancomycin Parenteral
- Meropenem
- Ceftriaxone

Hosp 2
- Clarithromycin
- Amoxicillin
- Levofloxacin
- Amoxicillin and enzyme inhibitor
- Piperacillin and enzyme inhibitor
- Meropenem
- Ampicillin
- Cefotaxime
- Ciprofloxacin
- Azithromycin
- Ceftriaxone
Top 5 most frequently used antibiotics for surgical prophylaxis in adults and children

Hosp 1
- Amoxicillin and enzyme inhibitor
- Levofoxacin
- Cefcapene
- Cefuroxime
- Cefalexin
- Cefazolin
- Ampicillin and enzyme inhibitor
- Gentamicin
- Metronidazole Parenteral
- Cefalotin
- Ceftriaxone

Hosp 2
- Amoxicillin and enzyme inhibitor
- Levofoxacin
- Cefcapene
- Cefuroxime
- Ceftriaxone
- Cefazolin
- Metronidazole Parenteral
- Cefalexin
- Gentamicin
- Cefalotin
- Ceftriaxone

Iran
- Hosp 1 (N = 28 patients)
- Hosp 2 (N = 94 patients)
- Continent (N = 161 patients in 4 hospitals)
- Hospital type (N = 1217 patients in 27 hospitals)
- Europe (N = 3229 patients in 180 hospitals)
Duration of surgical prophylaxis in adults and children

Hosp 1
(N = 28 patients)

Hosp 2
(N = 94 patients)

RAN, ISLAMIC REPUBLIC OF
(N = 161 patients)

East & South Asia
(N = 1217 patients in 6 countries)

Tertiary hospital
(N = 1078 patients)

Europe
(N = 3240 patients in 25 countries)

Legend:
- single dose
- one day
- more than one day
## Type of antibiotic treatment

<table>
<thead>
<tr>
<th></th>
<th>Hosp 1</th>
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<th>Country</th>
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<th>Hospital type</th>
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<td>%</td>
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</table>

Selection on antibiotic treatments.

*N = number of antibiotics (J01) included per type of treatment and subgroup (all patients, adults, children and neonates).*

Country: IRAN, ISLAMIC REPUBLIC OF; Continent: East & South Asia; Hospital type: Tertiary hospital
# Treatment based on microbiology data

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</tr>
</tbody>
</table>

N = the number of patients reported to have received a targeted treatment against one of the 9 microbiological results.

% = 100*(the number of patients reported to have received a targeted treatment/total number of patients receiving a therapeutic treatment (CAI or HAI) with at least one antibacterial for systemic use (J01)).

Country: IRAN, ISLAMIC REPUBLIC OF; Continent: East & South Asia; Hospital type: Tertiary hospital
Obtain meaningful comparisons – Interpret the results for your hospital

• Very different antibiotic prescribing practices are observed, worldwide as well as within a nation (eg Iran)
  – Quantity of antibiotics
  – Quality of antibiotics (broad-narrow spectrum, parenteral-oral use)
  – Quality indicators (eg guidelines, targeted prescribing, reason in notes etc)

• In depth study of results/ feedback
  – Find explanations for certain observed results (institutional and patient characteristics, health care system, local resistance patterns, etc.)
  – Choose feasible targets to improve antibiotic prescribing
  – Intervention: set up or strengthen an antimicrobial stewardship program
  – Repeat the PPS

NEXT Global-PPS is foreseen for January-June 2017
Obtain meaningful comparisons

✓ Uniformity of data collection: common simple methodology and web-based tool for data entry and validation = feasible & achievable surveillance

✓ Quality assurance approach

✓ Enables in-depth interpretation of antimicrobial consumption data at different levels

✓ Creation of reference database for scientific research and hypothesis formulation at national and international level (data are safeguarded at the University of Antwerp, Belgium, Europe).
Features of the Global-PPS

• Identification of targets for quality improvement
• **Tool for assessing interventions** to improve antibiotic prescribing in hospitals when PPS repeated
• Improve antibiotic use for **better patient health**
• **Combat antibiotic resistance**

“**sustained awareness**”
Acknowledgements

• Hundreds of healthcare professionals who were voluntarily collecting and submitting data globally

• The Global-PPS development group

• People who voluntary helped us with translation of protocol and data-collection templates
  ➢ I’m looking for a volunteer to help with the Arabic/Persian translation

• So many other people to thank!
Future: next Global-PPS

JANUARY – JUNE 2017

ANY HOSPITAL IS WELCOME TO PARTICIPATE!

URL: www.global-pps.com
Contact: global-PPS@uantwerpen.be