

Evaluation of Ambulatory Antibiotic Consumption in Children and Adult Patients of a Healthcare System in Bolivia Using the AWaRe Classification

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BACKGROUND

- The World Health Organization (WHO) has established the AWaRe (*Access, Watch and Reserve*) classification based on the impact of different antibiotics on antimicrobial resistance. For ambulatory patients, WHO recommends *Access* antibiotics to represent >60% of all prescriptions, and an *Access to Watch (AW)* index of ≥ 1.5 . The use of *Access* and *Watch* antibiotics has not been evaluated in ambulatory patients in Latin America.

OBJECTIVE

- To describe antibiotic use among members of two health plans within a private health insurance in Bolivia.

METHODS

- We retrospectively evaluated antibiotic consumption among 8,405 members of a private healthcare system in Santa Cruz de la Sierra, Bolivia, between Jan-2017 and Dec-2018.
- We compared antibiotic consumption (defined daily doses (DDD) per 1,000 member-days) between two plans: a Health Maintenance Organization (HMO) (2,419 members) and a Preferred Provider Organization (PPO) (5,986 members).
- In the HMO plan, members have a general practitioner (GP) as the primary point of care, whereas in the PPO plan, members can access specialists directly without a referral from the GP.

RESULTS

- Overall antibiotic consumption for the study period was 8.31 DDD/1,000 member-days in the ambulatory setting, 10.7 in the Emergency Department, and 0.72 in the hospital (**Table 1**).
- Ambulatory antibiotic consumption in the HMO plan was lower than the PPO plan (6.95 vs. 8.89 DDD/1,000 member-days; diff. -1.94, 95%CI -2.15 to -1.72) (**Table 2**).
- Of all ambulatory antibiotics, 55% were *Access* and 45% were *Watch* (AW index: 1.24) (**Tables 3 and 4**)
 - By patient group, 52% of pediatric and 58% of adult prescriptions were *Access*; diff. -6%; $p < 0.001$ (AW index: 1.07 and 1.39, respectively)
 - By health plan, 62% of HMO and 53% of PPO antibiotics were *Access*; diff. 9%; $p < 0.001$ (AW index: 1.66 and 1.13, respectively)

RESULTS

Table 1. Antibiotic consumption by area of prescription

Antibiotic group*	DDD per 1,000 member-days			
	Ambulatory	Emergency	In-hospital	Total
Penicillins + beta-lactamase inhibitors	2,79	4,61	0,13	7,53
Macrolides	2,07	2,94	0,09	5,10
Penicillins with extended spectrum	0,87	1,03	0,02	1,92
3G Cephalosporins	0,52	0,95	0,20	1,67
Fluoroquinolones	0,80	0,51	0,02	1,33
Sulfamethoxazole+trimethoprim	0,38	0,34	0,01	0,73
Tetracyclines	0,45	0,02	0,00	0,47
1G Cephalosporins	0,14	0,18	0,12	0,44
Nitrofurantoin	0,15	0,05	0,00	0,20
Aminoglycosides	0,05	0,03	0,08	0,15
Lincosamides	0,02	0,02	0,02	0,06
Beta-lactamase resistant penicillins	0,04	0,01	0,00	0,05
Beta-lactamase sensitive penicillins	0,03	0,00	0,00	0,03
Carbapenems			0,02	0,02
Glycopeptides			0,01	0,01
Total	8,31	10,70	0,72	19,72

References: *J01 group ATC-WHO classification; DDD: Defined Daily Doses

Table 2. Ambulatory antibiotic consumption in HMO vs. PPO plans

Antibiotic group*	DDD per 1,000 member-days				p	Variation
	HMO	PPO	Diff. HMO vs PPO	95%CI		
Penicillins + beta-lactamase inhibitors	2.65	2.85	-0.20	-0.32 to -0.07	0.0032	↓
Macrolides	1.17	2.46	-1.29	-1.38 to -1.19	0.0000	↓
Penicillins with extended spectrum	0.79	0.90	-0.11	-0.19 to -0.05	0.0018	↓
Fluoroquinolones	0.72	0.84	-0.12	-0.19 to -0.05	0.0007	↓
3G Cephalosporins	0.21	0.65	-0.44	-0.49 to -0.39	0.0000	↓
Tetracyclines	0.63	0.38	0.25	0.20 to 0.31	0.0000	↑
Sulfamethoxazole+trimethoprim	0.40	0.37	0.03	-0.01 to 0.08	0.1732	
Nitrofurantoin	0.15	0.14	0.01	0.03 to -0.03	0.7804	
1G Cephalosporins	0.07	0.17	-0.10	-0.13 to -0.08	0.0000	↓
Aminoglycosides	0.07	0.04	0.03	0.02 to 0.06	0.0000	↑
Beta-lactamase resistant penicillins	0.02	0.05	-0.03	-0.04 to -0.02	0.0000	↓
Beta-lactamase sensitive penicillins	0.05	0.02	0.03	0.01 to 0.04	0.0002	↑
Lincosamides	0.02	0.02	0.00	0.01 to -0.01	0.5873	
Total	6.95	8.89	-1.94	-2.15 to -1.72	0.0000	↓

References: *J01 group ATC-WHO classification; DDD: Defined Daily Doses; HMO: Health Maintenance Organization; PPO: Preferred Provider Organization

Table 3. Ambulatory antibiotic consumption stratified by WHO category and by patient group

WHO category	Pediatrics			Adults			Total		
	DDD per 1,000 member-days	% of total	Ratio A/W	DDD per 1,000 member-days	% of total	Ratio A/W	DDD per 1,000 member-days	% of total	Ratio A/W
<i>Access</i> *	5,35	51,8%	1,07	4,20	58,1%	1,39	4,60	55,4%	1,24
<i>Watch</i>	4,98	48,2%		3,03	41,9%		3,71	44,6%	
Total	10,33	100,0%		7,23	100,0%		8,31	100,0%	

* Difference in "access" proportion: -6%; $p < 0.001$

References: A: "access"; W: "watch"; DDD: Defined Daily Doses

Table 4. Ambulatory antibiotic consumption stratified by WHO category and by health plan

WHO category	HMO			PPO			Total		
	DDD per 1,000 member-days	% of total	Ratio A/W	DDD per 1,000 member-days	% of total	Ratio A/W	DDD per 1,000 member-days	% of total	Ratio A/W
<i>Access</i>	4,34	62,4%	1,66	4,71	53,0%	1,13	4,6	55,4%	1,24
<i>Watch</i>	2,61	37,6%		4,17	46,9%		3,71	44,6%	
Total	6,95	100,0%		8,89	100,0%		8,31	100,0%	

* Difference in "access" proportion: 9%; $p < 0.001$

References: A: "access"; W: "watch"; DDD: Defined Daily Doses; HMO: Health Maintenance Organization; PPO: Preferred Provider Organization

CONCLUSIONS

- Ambulatory antibiotic consumption in this cohort was high, with a lower use of *Access* antibiotics than the recommended by WHO
- Less antibiotic use and fewer broad-spectrum antibiotic were observed in the HMO plan compared to the PPO plan
- These findings highlight the urgent need for antibiotic stewardship in the ambulatory setting, and the important role of GPs in appropriate antibiotic prescribing

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