APPLICATION OF NEW INDICATORS OF ANTIMICROBIAL AGENTS USE BASED ON CONSUMPTION IN A TERTIARY HOSPITAL

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What was it done?

The creation of a tool for calculating new indicators of antimicrobial agents based on consumption using Defined Daily Dose per 100 hospital stays (DDD/100s).

Why was it done?

Spanish Society of Hospital Pharmacy(SEFH) proposed 13 indicators (bibliography: *Gutiérrez-Urbón JM, Gil-Navarro MV, Moreno-Ramos F, Núñez-Núñez M, Paño-Pardo JR, Periáñez-Párraga L. Indicators of the hospital use of antimicrobial agents based on consumption. Farm Hosp. 2019;43(3):94-100*) which could help to improve the quality of antimicrobial use.

Indicators are related: Higher value Better practices | Lower value Better practices | Homogeneous percentages (%) Better practices

How was it done?

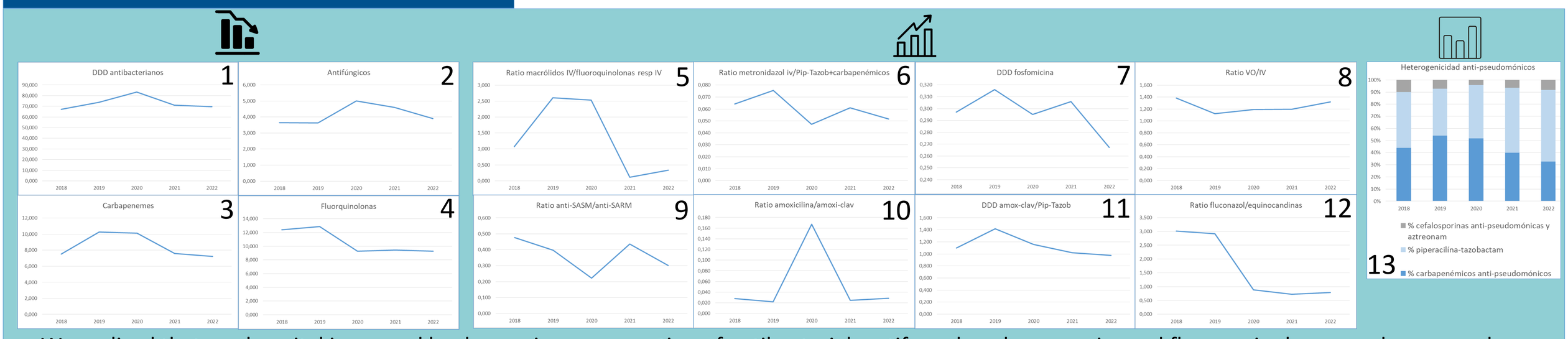
We built an Excel tool to input required data in order to calculate the indicators with the formulas defined for their automated estimation:

	Overall antibacterial consumption	1
	Overall consumption of antifungals	2
	Consumption of carbapenemics	3
	Consumption of fluoroquinolones	4
	Ratio macrolides-p/fluoroquinolones-p	5
	Ratio metronidazole-p/piperacillin-tazobactam+carbapenemics	6
	Fosfomycin consumption	7
	Sequential therapy	8
	Ratio anti-SRSA/anti-MRSA agents	9
	Ratio amoxicillin/amoxicillin-clavulanic acid	10
	Ratio amoxicillin-clavulanic acid/piperacillin-tazobactam	11
	Ratio fluconazole/equinocandins	12
	Diversification of anti-pseudomonas beta-lactam: %anti-pseudomonal carbapenemics, %piperacillin-tazobactam and %anti-pseudomonal cephalosporins+aztreonam	13

INDICADORES	Justificación	Relación indicador/	Datos necesarios para indicadores	2018	2019	2020	2021	2022
Consumo global de		Indirecto	DDD antibacterianos	67,082	73,725	83,453	71,119	69,685
Consumo global de antifúngicos		Indirecto	DDD antifúngicos	3,646	3,630	5,010	4,590	3,910
Consumo de carbapenémicos	Antibióticos de amplio espectro, impacto ecológico.	Indirecto	DDD imipenem	1,578	4,100	4,261	0,305	0,197
			DDD meropenem	4,535	4,540	4,230	5,963	4,728
			DDD ertapenem	1,419	1,620	1,620	1,333	2,299
			DDD carbapenémicos	7,532	10,260	10,111	7,601	7,224
Consumo de fluoroquinolonas	Asociados con selección de resistencias	Indirecto	DDD ciprofloxacino	4,510	4,530	3,788	4,836	4,371
			DDD norfloxacino	0,058	0,100	0,077	0,065	0,075
			DDD levofloxacino	7,677	8,130	5,353	4,445	4,694
			DDD moxifloxacino	0,155	0,110	0,072	0,087	0,127
			DDD ofloxacino	0,000	0,000	0,000	0,000	0,000
			DDD fluoroquinolonas	12,400	12,870	9,290	9,433	9,266
Ratio macrólidos IV/ fluoroquinolonas resp IV	Su uso aproxima al uso combinado en neumonías, previene el uso de quinolonas	Directo	DDD eritromicina IV	1,492	4,297	3,658	0,042	0,109
			DDD azitromicina IV	0,055	0,032	0,174	0,090	0,189
			DDD claritromicina IV	0,110	0,009	0,002	0,008	0,013
			DDD macrólidos IV	1,657	4,338	3,834	0,140	0,311
			DDD levofloxacino IV	1,545	1,663	1,516	1,249	0,928
			DDD moxifloxacino IV (no)	0,000	0,000	0,000	0,000	0,000
			DDD fluoroquinolonas resp IV	1,545	1,663	1,516	1,249	0,928
			Ratio macrólidos IV/fluoroquinolonas resp IV	1,072	2,609	2,529	0,112	0,335
Ratio metronidazol iv/ Pip-Tazob+carbapenémicos	Antibiótico anaerobio selectivo. Su uso previene el consumo de antibióticos de amplio espectro	Directo	DDD metronidazol IV	0,894	1,242	0,820	0,972	0,831
			DDD piperacilina/tazobactam	6,376	6,189	7,248	8,366	8,875
			DDD carbapenémicos	7,532	10,260	10,111	7,601	7,224
			DDD Pip-Tazob y carbapenémicos	13,908	16,449	17,359	15,967	16,099
			Ratio metronidazol iv/Pip-Tazob+carbapenémic	0,064	0,076	0,047	0,061	0,052
Consumo fosfomicina	VO de elección en cistitis no complicada e IV en combinación como tto de infecciones multirresistentes; diversifica la presión antibiótica	Directo	DDD fosfomicina	0,297	0,316	0,295	0,306	0,267
Terapia secuencial	Asociado con paso a VO de antimicrobianos con misma eficacia, menos RA y menor coste	Directo	DDD amoxi-clav VO	5,828	6,557	6,445	6,655	6,844
			DDD eritromicina VO	0,175	0,217	0,146	0,216	0,241
			DDD azitromicina VO	1,137	0,217	7,091	2,054	1,932
			DDD claritromicina VO	0,065	0,032	0,035	0,082	0,053
			DDD macrólidos VO	1,377	0,466	7,272	2,352	2,226
			DDD ciprofloxacino VO	3,120	3,337	2,434	3,260	3,063
			DDD norfloxacino VO	0,058	0,096	0,076	0,065	0,075
			DDD levofloxacino VO	6,133	6,666	3,785	3,196	3,766
			DDD moxifloxacino VO	0,155	0,113	0,068	0,087	0,127
			DDD ofloxacino VO	0,000	0,000	0,000	0,000	0,000
			DDD quinolonas VO	9,466	10,212	6,363	6,608	7,031

DDD/100s for the years 2018-2022 were calculated in order to see the annual evolution. Required data: antibiotic (ATC Group:J01) and antifungal (ATC Group:J02) consumption by drug and route of administration (oral (o), parenteral (p) and others).
Calculation of DDD/100s according to grams consumed (obtained with Hospital Pharmacy software) and ATC/DDD-Index.

What has been achieved?



- We realized that our hospital improved by decreasing consumption of antibacterial, antifungal, carbapenemics and fluoroquinolones; and so, an early parenteral-oral switch.
- However, the other ratio-based indicators are stable or worsening yearly: macrolides-p/fluoroquinolones-p, metronidazole-p/piperacillin-tazobactam +carbapenemics, fosfomycin consumption, anti-SRSA/anti-MRSA agents, amoxicillin/amoxicillin-clavulanic acid, amoxicillin-clavulanic acid/piperacillin-tazobactam, fluconazole/equinocandins and diversification of anti-pseudomonas beta-lactam.

What next?

- These indicators provide possible improvement actions to enhance the use of antimicrobial agents. Consumption of fosfomycin or amoxicillin/amoxicillin-clavulanic acid ratio should be cautiously analyzed due to outpatient (or in emergencies) management of uncomplicated infections.
- As improvement actions in our hospital, increase the use of metronidazole-p in anaerobic infections or cloxacillin and cefazolin de-escalation can be promoted as soon as sensitivity is confirmed by antibiogram-test. Diversify antibiotic pressure on pseudomonas, trying to reduce piperacillin-tazobactam by prescribing ceftazidime or cefepime, and reserving aztreonam for beta-lactams allergics. Similarly, decrease piperacillin-tazobactam use by prescribing amoxicillin-clavulanic acid if anti-pseudomonal coverage isn't necessary.

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