

Impact of the Rational Antibiotic Use System on Hospital Performance at Cartagena Colombia from 2018 to 2021

Fernandez Mercado JC1, Alvis-Zakzuk NR2, Alvis Guzman N3, Iglesia R4, Angulo T4, Castañeda C4, Blanco MT4

1MUTUALSER EPS - University of Cartagena - Clínica Crecer, Cali, VAC, Colombia, 2ALZAK Foundation, Cartagena de Indias, BOL, Colombia, 3ALZAK Foundation- Universidad De La Costa, Barranquilla, Colombia, 4CLINICA CRECER, CARTAGENA, Colombia

Abstract:

OBJECTIVES: To describe the experience carried out with the implementation and the Impact of the Rational Antibiotic Use System on Hospital Performance, at Cartagena, Colombia from 2018 to 2021, and the progressive decrease in the consumption of control antibiotics monitored by the National Institute of Health (INS). Compared to national and departmental averages.

METHODS: retrospective and descriptive study was carried out. The antimicrobial application records generated from the institutional electronic medical record (Software Dinamica Gerencial) and the Control Antibiotic Consumption reports published by the INS in the periods between 2018 and 2021 were used. The methodology for measuring antibiotic consumption is carried out as proposed by the WHO, which uses the Defined Daily Dose (DDD). This was calculated with the number of DDDs between 100 days of stay

RESULTS: In the group of carbapenems, the reduction in the consumption of the antibiotic Meropenem between the periods 2018 and 2021 in the Adult General Hospitalization and Adult Critical Care Unit services is notable, with a reduction of 35% and 57%, respectively. Likewise, there is a significant decrease in the consumption of Ceftriaxone of 95% for the Adult General Hospitalization service and 32% for the Adult Critical Care Unit, and beta-lactams such as Piperacillin, with a 5% reduction in Adult General Hospitalization. and 62% Adult Critical Care Unit.

CONCLUSIONS: With the implementation of this program and the optimization strategies executed, the impact on the reduction of the consumption indicators of the Defined Daily Dose in the control antibiotics monitored by INS is shown, which place us below the departmental consumption averages. and nationals. This strategy must be replicated in all health institutions as a clinical practice that improves the quality of health care.

INTRODUCTION

The Rational Use of Antibiotics Program adopted the strategy recommended in the technical guidelines for the implementation of antimicrobial optimization programs issued by the Colombian Association of Infectious Diseases (ACIN, 2019), related to the implementation of prospective audits with feedback through the rounds of infectology, application form to start antimicrobial therapy in the electronic medical record to monitor the duration of control antibiotics, interconsultation module arranged to improve communication of the multidisciplinary team, the creation of a group chat that allows informing culture results in a timely manner and continuous follow-up of patients with control antibiotics in a timely manner and the active search for these.

Bacterial resistance generates an increase in the consumption of broad-spectrum antibiotics and has an impact on the effectiveness of the provision of health services, therefore the objective of this paper is to describe the results of the Program for the Rational Use of Antimicrobials of the Centro Medico Crecer Ltda in the periods between 2018 and 2021 in the Adult Critical Care Unit and Adult General Hospitalization services.

OBJETIVE

To describe the experience carried out with the implementation of the Program for the Rational Use of Antimicrobials at the Centro Medico Crecer Ltda during the periods between 2018 and 2021, and the progressive decrease in the consumption of control antibiotics monitored by the National Institute of Health (INS). compared to national and departmental averages.

METHODOLOGY

A retrospective and descriptive study was carried out. The antimicrobial application records generated from the institutional electronic medical record (Software Dinamica Gerencial) and the Control Antibiotic Consumption reports published by the INS in the periods between 2018 and 2021 were used.

The measurement of antibiotic consumption was made to: Ceftriaxone, Cefepime, Meropenem, Piperacillin/Tazobactam, Vancomycin for parenteral use and Ciprofloxacin for oral and

parenteral use; the latter monitored only in the Adult General Hospitalization service (INS, 2014). For the Adult Critical Care Unit service, they were:

The methodology for measuring antibiotic consumption is carried out as proposed by the WHO, which uses the Defined Daily Dose (DDD). This was calculated with the number of DDDs between 100 days of stay, through the following formula:

$$\text{DDD}/100 \text{ bed-days} = (\text{grams of antimicrobial/specific DDD}) / [\text{occupancy ratio} \times \text{number of beds} \times \text{time (days of the month)}] \times 100.$$

Once the DDD were determined, the consumption averages for each antibiotic were calculated by the Adult General Hospitalization service and the Adult Critical Care Unit, later the results were compared with the national and departmental averages.

RESULTS AND DISCUSSION

Description of the results of the rate of consumption of control antibiotics expressed in DDD in the Adult General Hospitalization and Adult Critical Care Unit services:

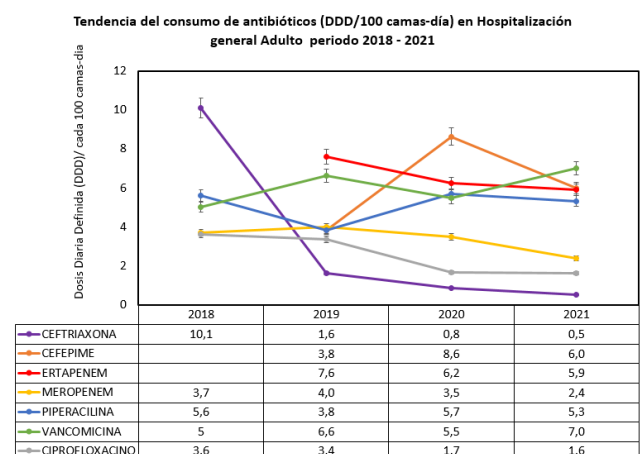


Figure 1. Trend in the consumption of antibiotics (DDD/100 beds-day) in Adult General Hospitalization period 2018 – 2021.

Table 1. Result of Consumption of antibiotics (DDD/100 beds-day) VS average of National and Departmental Consumption in Adult General Hospitalization period 2018 – 2021 (INS, 2018; INS, 2019; INS, 2020; INS, 2021).

ANTIBIOTIC		2018	2019	2020	2021	Percentage difference between 2018-2021
CEFTRIAXONA	DDD	10,1	1,6	0,8	0,5	-95%
	VP (%)	0%	-84%	-48%	-39%	
	P.N	7,5	8,1	9,7	11,8	
	P.D	3,5	0,2	0,4	2,9	
CEFEPIME	DDD	2,9	3,8	8,6	6	106%
	VP (%)	0%	31%	126%	-30%	
	P.N	N/A	2,1	3,2	3,1	
	P.D	N/A	3	5,7	3,1	
MEROPENEM	DDD	3,7	4	3,5	2,4	-35%
	VP (%)	0%	8%	-13%	-31%	
	P.N	7,3	5	6,1	5,8	
	P.D	5,4	3,8	2,3	3,2	
PIPERACILINA	DDD	5,6	3,8	5,7	5,3	-5%
	VP (%)	0%	-32%	50%	-7%	
	P.N	6,3	6,8	9,1	7,5	
	P.D	7,5	4,8	2	7	
ERTAPENEM	DDD	5,7	7,6	6,2	5,9	3%
	VP (%)	0%	33%	-18%	-5%	
	P.N	N/A	0,9	2,5	0,7	
	P.D	N/A	0,8	2	0,8	
VANCOMICINA	DDD	5,0	6,6	5,5	7	40%
	VP (%)	0%	32%	-17%	27%	
	P.N	4,4	4,4	7	5,9	
	P.D	4,7	1,8	2,3	4,2	
CIPROFLOXACINO	DDD	3,6	3,4	1,7	1,6	-55%
	VP (%)	0%	-5%	-50%	-6%	
	P.N	10,3	7,2	9,2	8,4	
	P.D	4,5	0,2	0,1	2,4	

*DDD: Defined Daily Dose Centro Medico Crecer, VP%: Percentage variation between periods, P.N: National Average and P.D: Departmental Average.

PIPERACILINA	DDD	11,4	14,7	6,2	7,1	-62%
	VP (%)	0%	29%	-58%	15%	
	P.N	16,2	17,5	17,9	14,5	
	P.D	16,4	7,8	8,2	15,1	
ERTAPENEM	DDD	5	6,6	2,5	6,2	20%
	VP (%)	0%	32%	-62%	148%	
	P.N	N/A	0,6	3,7	0,4	
	P.D	N/A	1,2	0,8	0,9	
VANCOMICINA	DDD	6,3	11,4	5,8	8,6	36%
	VP (%)	0%	81%	-49%	49%	
	P.N	13,2	12,6	13,9	11,9	
	P.D	11,8	8,0	8,6	12,6	

*DDD: Defined Daily Dose Centro Medico Crecer, VP%: Percentage variation between periods, P.N: National Average and P.D: Departmental Average.

In the group of carbapenems, the reduction in the consumption of the antibiotic Meropenem between the periods 2018 and 2021 in the Adult General Hospitalization and Adult Critical Care Unit services is notable, with a reduction of 35% and 57%, respectively. Likewise, there is a significant decrease in the consumption of Ceftriaxone of 95% for the Adult General Hospitalization service and 32% for the Adult Critical Care Unit, and beta-lactams such as Piperacillin, with a 5% reduction in Adult General Hospitalization. and 62% Adult Critical Care Unit (See Table 1 and Table 2).

The results obtained from the consumption of antibiotics in the General Hospitalization service and the Adult Critical Care Unit show a percentage variation with an increasing trend in the use of fourth-generation cephalosporins such as Cefepime and glycopeptides such as Vancomycin during the pandemic, since these were used as a primary alternative for the management of sepsis, septic shock, multiple organ failure, or unexplained clinical deterioration before day 7 of onset of symptoms of SARS-CoV-2 infection, according to the indications established by the consensus of Experts of the Association Colombiana of Infectologia in the year 2020 (ACIN, 2020) (See Figure 1 and 2). However, it is important to highlight that with a view to minimizing the consumption of said antibiotics, work was done to reduce their treatment time from 14 to 7 days and the timely scaling to alternatives that may exert less selective pressure on microorganisms, taking into account the clinical picture of these patients and the results of the cultures necessary 72 hours after starting treatment, due to the above, a decrease in the consumption of Cefepime of 28% was obtained between the period 2020 to 2021, going from 9.1 to 6.6 DDD/100 bed days in the Adult Critical Care Unit service and 30% from 9.6 to 6 DDD/100 bed days in the Adult General Hospitalization service (See Table 1 and 2).

CONCLUSIONS:

With the implementation of this program and the optimization strategies executed, the impact on the reduction of the consumption indicators of the Defined Daily Dose in the control antibiotics monitored by INS is shown, which place us below the departmental consumption averages. and nationals. This strategy must be replicated in all health institutions as a clinical practice that improves the quality of health care.

Tendencia del consumo de antibióticos (DDD/100 camas-día) en Unidad de Cuidado Crítico Adulto periodo 2018 - 2021

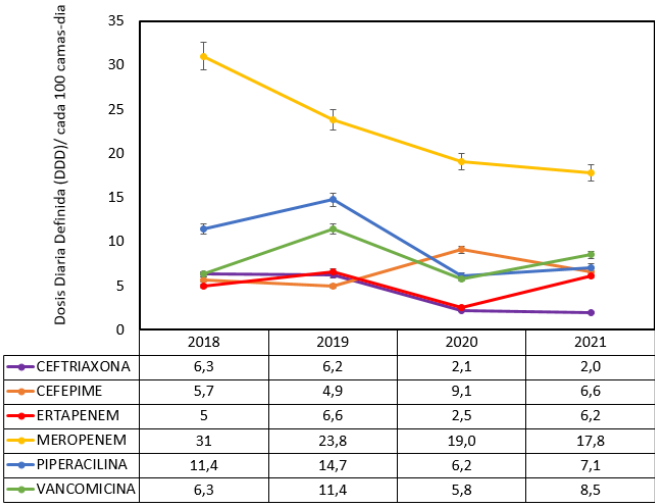


Figure 2. Trend in the consumption of antibiotics (DDD/100 beds-day) in the Adult Critical Care Unit for the period 2018-2021.

Table 2. Result of Consumption of antibiotics (DDD/100 beds-day) VS average National and Departmental Consumption in the Adult Critical Care Unit service period 2018 – 2021 (INS, 2018; INS, 2019; INS, 2020; INS, 2021).

ANTIBIOTIC		2018	2019	2020	2021	Percentage difference between 2018-2021
CEFTRIAXONA	DDD	6,3	6,2	2,1	2,0	-32%
	VP (%)	0%	-1%	-66%	-8%	
	P.N	6,6	5,2	8,5	9,2	
	P.D	5	0,2	1,1	3,6	
CEFEPIME	DDD	5,7	4,9	9,1	6,6	16%
	VP (%)	0%	-14%	84%	-28%	
	P.N	N/A	6,0	9,4	7,3	
	P.D	N/A	10,7	7,5	10,1	
MEROPENEM	DDD	31	23,8	19,0	17,8	-57%
	VP (%)	0%	-23%	-20%	-6%	
	P.N	26	21,6	19,5	18,0	
	P.D	23,6	23,3	22,1	17,8	

