

EVALUATION OF CONSUMPTION IN DDD OF OTHER BETA-LACTAM ANTIBACTERIALS USE IN HOSPITALS

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Summary

Other beta-lactam antibacterials remain as the most consumption antibiotics in hospitals with the rate around 50% from all of them. The strategic action plan on antibiotic resistance with the slogan “No action today, no cure tomorrow” was marketed at the World Health Organization Day in 2011. From this event start a number of key strategic actions that proposed to mitigate, prevent and control antibiotic consumption and resistance. These include promoting the prudent use of antibiotics across many sectors; strengthening surveillance systems to monitor the use of antibiotics and resistant bacteria and others. Our aim was to evaluate institutional representative data on other beta-lactam antibacterials utilization for a period of six years (2009-2014), according to WHO requirements to determine value of defined daily doses (DDD) per 1000 occupied occupied-bed days (OBD). The cephalosporin's G-I decrease considerably consumption form 192.2 to 96.8 DDD/1000 or by 50% and conversely cephalosporin's G-II and G-III recorded an increase from 78 (16.1 + 61.9) to 173.9 (49.4 + 124.5) DDD / 1000 or 2.3 times. A big change was observed in ratio of DDD/1000 used for parenteral and respectively oral forms from 268.5 (99.1%) and 2.2 (0.9%) in 2009 to 247.3 (90.7%) and 25.3 (9.3%) in 2014.

Key words: antibiotics, consumption, hospital, program, defined daily doses, occupied-bed days, rational use

Rezumat. Evaluarea consumului în DDD a altor beta-lactame antibiotice utilizate în spitale

Antibioticele din grupa altor beta-lactame rămân cele mai mult utilizate în spitale cu o rată aproximativ de 50% din totalul acestora. La Ziua Organizației Mondiale a Sănătății în anul 2011 a fost determinat planul de acțiune referitor la rezistența antibioticilor cu sloganul „Nu acționăm azi, nu tratăm mâine”. Acest eveniment a pus începutul unor acțiuni strategice care au ca scop atenuarea, prevenirea și controlul consumului de antibiotice și rezistenței microbilor patogeni la remediile antiinfecțioase de uz sistemic. Măsurile date include promovarea unui control prompt al consumului de antibiotic în mai multe sectoare; îmbunătățirea sistemelor de evaluare și monitorizare a consumului de antibiotice și rezistenței microbilor patogeni la antibiotice și altele. Ne-am propus ca scop evaluarea consumului de antibiotice din grupa beta-lacta în baza datelor instituției în anii 2009 – 2014, în conformitate cu cerințele OMS pentru determinarea dozelor definite de remedii medicamentoase utilizate la 1000 de pacienți sau 1000 paturi ocupate. Așa din anul 2009 până în anul 2014 cefalosporinele generației I au înregistrat o descreștere a consumului de la 192.2 până la 96.8 DDD/1000 sau cu 49.64% și contraversa cefalosporinele generațiilor II și III au marcat o creștere de la 78 (16.1 + 61.9) până la 173.9 (49.4 + 124.5) DDD/1000 sau de 2.3 ori.

Cuvinte-cheie: antibiotic, consum, spital, program, doză definită pentru una zi, zile pat ocupate, consum rațional

Резюме. Изучение показателей расхода среднесуточных доз антибиотиков группы других бета лактамов в госпиталях

Антибиотики группы других бета лактамов находят самое широкое применение в больницах и составляют в среднем 50% от общего их расхода. В 2011 году в День Всемирной Организации Здравоохранения был определен план действия в отношении антибиотикорезистентности под лозунгом «Бездействуем сегодня, завтра лечить некого».

Это событие стало началом конкретных стратегических действий с целью смягчения, предупреждения и контроля расхода антибиотиков и резистентности патогенных антибиотиков на антибиотики. Запланированные действия включают строгий контроль над расходом антибиотиков по многим направлениям; модернизацию систем изучения и мониторинга расхода антибиотиков и резистентности патогенных антибиотиков на антибиотики. Наша задача состояла в изучении расхода антибиотиков группы другие бета лактамы на базе данных Института Ургентной Медицины в 2009 – 2014 годах, в соответствии с требованиями ВОЗ по определению среднесуточных доз расхода медикаментов на 1000 больных или 1000 занятых коек. Результаты изучения показывают что, расход цефалоспоринов с 2009 по 2014 годов первой генерации понизился с 192.2 до 96.8 DDD/1000 или на 49.64%, а расход цефалоспоринов второй и третьей генерации наоборот повысился с 78 (16.1 + 61.9) до 173.9 (49.4 + 124.5) DDD/1000 или на 2.3 раза.

Ключевые слова: антибиотик, расход, госпиталь, определенная среднесуточная доза, цефалоспорины, занятые койко-дни, рациональное использование

Introduction. Other beta-lactam antibacterials remain as the most consumption antibiotics in hospitals with the rate around 50% from all of them. Worldwide, cephalosporins are the most widely used

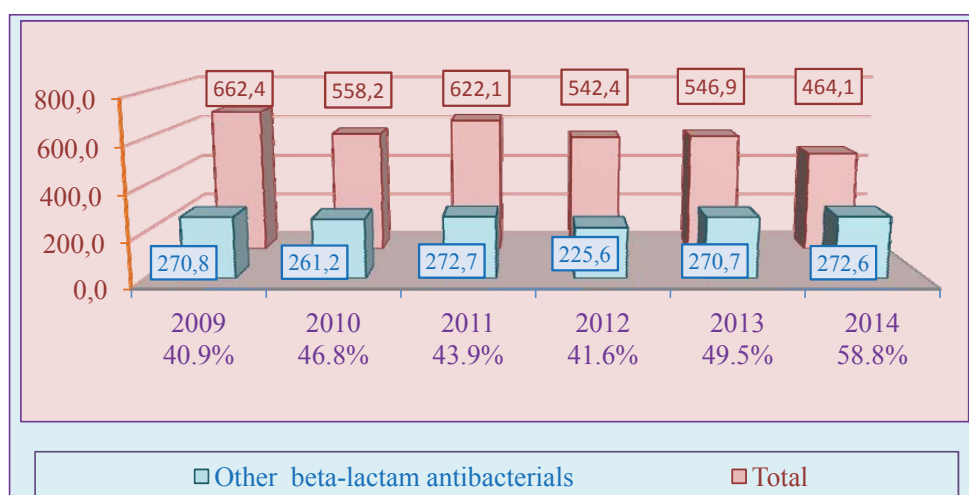


Fig. 1. The rate of other beta-lactam antibacterials from total antibiotics usage (parenteral and oral forms) in DDD/1000 OBD in 2009-2014

antibiotics for surgical prophylaxis. These drugs are recommended for prophylaxis because of their good safety profile, excellent antimicrobial activity against most of the bacteria causing postoperative wound infection, satisfactory penetration into critical tissues and, most importantly, a strong track record of efficacy in clinical trials [1].

The article aims at collating and evaluating data on the beta-lactam antibacterials usage in the Emergency Medicine Institute over a certain time, enabling the monitoring trends in use of this group of drugs. Present research covers cephalosporins utilization data, as a rate based on defined daily doses. This report provides data which could be used to target particular areas of antibiotics usage. At the hospital level the usage trends is a parameter for identifying overall changes in anti infective treatment practices [2].

The primary aim of the study was to evaluate institutional representative data on other beta-lactam antibacterials for a period of six years (2009-2014), according to WHO requirements to determine value of defined daily doses (DDD) per 1000 occupied occupied-bed days (OBD). Based on obtained data it aimed to make conclusions on the consumption of cephalosporins in hospitals for ensuring the optimization of planning needs and theirs rational use.

To determine DDD and compare the consumption of antibiotics for the period of 2009-2014, the statistics data concerning the number of treated patients, the number of occupied bed/days and total annual quantities of antibiotics were used. The total number of occupied bed/days in the institution was 188762 in 2009, 191556 in 2010, 186246 in 2011, 199816 in 2012, 193019 in 2013 and 187558 in 2014 [3,4,5,6].

Antimicrobial data are aggregated over the time period of interest at hospital level and converted to standardized usage route based on the WHO defi-

nition of DDD with 1000 OBD as the denominator [7,8,9].

Material and methods. For this study we used data on a six-year (2009-2014) period in EMI, which show the dynamics of consumption of medicinal remedies pharmaco-therapeutic other beta-lactam antibacterials of group J – Antibacterials for systemic use, as classified ATC, classification system of World Health Organization indicating the nature value. As the methods of study were used statistical, analytical, mathematical, comparisons, logical and descriptive.

Results and discussion. To determine DDD and compare the consumption of antibiotics for the period of 2009-2014, the statistics data concerning the number of treated patients (for only patients with health insurance and other free treated by the state categories of citizens), the number of occupied bed/days and total annual quantities of medicines were used.

In **figure 1** is demonstrated the total (parenteral and oral forms) antibiotic groups use rates of DDD/1000 OBD in comparison with other beta-lactam antibacterials in EMI. The average aggregate annual rate for total-hospital antibiotics utilization period decreased from 662.4 DDD/1000 OBD in 2009 to 464.1 DDD/1000 OBD in 2014, or by 29, 9%.

The other beta-lactam antibacterials for six years from January 2009 to January 2014, demonstrated a increase usage rate from the total annual consumption by 17.9% (from 40.9% to 58.8%). At the same time annual consumption of this group of antibiotics remain for five years in the middle around 270 DDD/1000.

In **figure 2** are presented trends of other beta lactams for enteral use in the evaluation period.

Like we can see in **figure 2** that from 2009 to 2014 intake of enteral forms cephalosporins G-I (first generation) increased by 10.7 times, G-II (second generation) by 22.2 times, G-III (first generation) by 4.3

times and for the whole group increase was form 2.2 to 25.3 DDD/1000 or by 11.5 times. In **figure 3** are presented trends in other beta lactams for parenteral use in the evaluation period.

From evaluated period total consumption of parenteral forms of cephalosporin’s G-I decreased by 2.45 times, but cephalosporin’s G-II and G-III has increased respectively by 2 times and 2.79 times. The total consumption of the group encounters a slight decrease from 268.5 to 247.3 DDD / 1000 or with 7.9%. In **figure 4** are presented trends in other beta lactams for parenteral and enteral use in the evaluation period.

From evaluated period total consumption of parenteral and enteral forms of cephalosporin’s G-I de-

creased with 49.63%, and cephalosporin’s G-II and G-III has increased respectively by 3.07 times and 2.01 times. The total consumption of the group encounter a slight increase from 270.7 to 272.6 DDD / 1000 or with 0.7%.

The date presented in **figure 5** demonstrated that from the total consumption of other beta lactams antibacterials, parenteral forms rated 99.1% in 2009 and 90.7% respectively in 2014, and for enteral forms respectively 0.9% and 9.3%.

In total for providing antibacterial treatment in EMI in mentioned period were used 13 medical remedies for both enteral the parenteral administration, of which only enteral forms 3 names, only parenteral

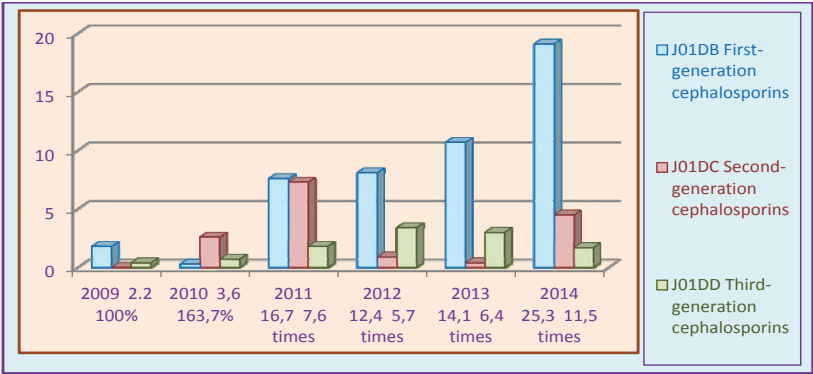


Fig. 2. Consumption of other beta lactams usage rates DDD/1000 OBD in 2009-2014 (enteral usage)

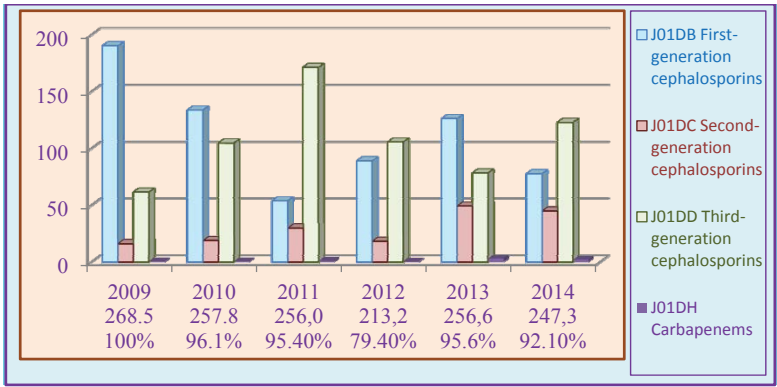


Fig. 3. Consumption of other beta lactams usage rates DDD/1000 OBD in 2009-2014 (parenteral usage)

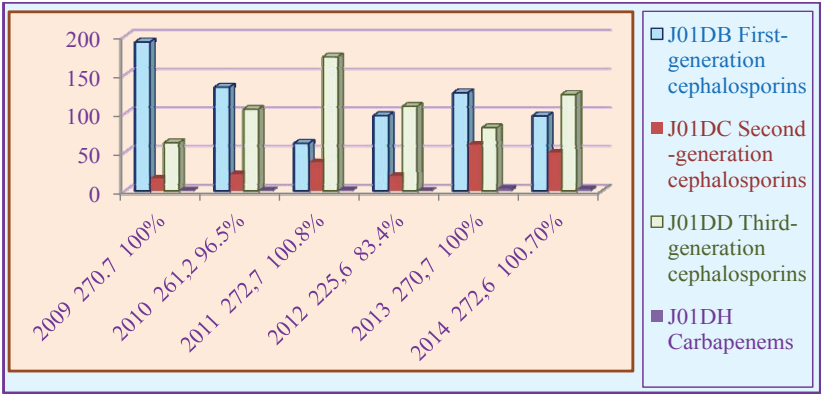


Fig. 4. Total consumption trends of other beta lactams parenteral and enteral forms use in 2009 to 2014

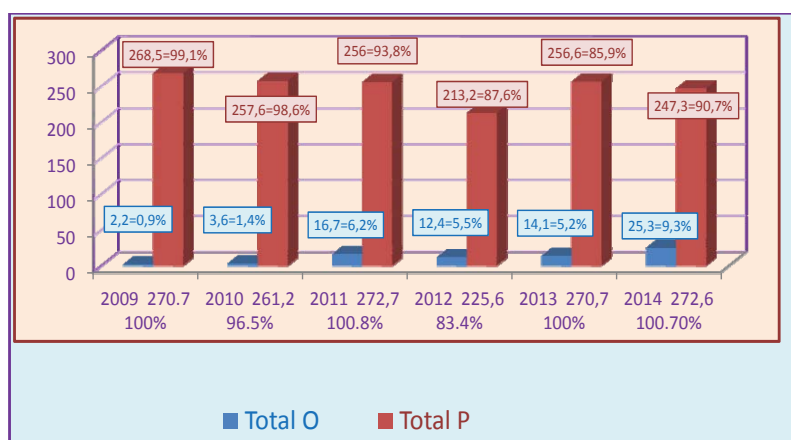


Fig. 5. Other beta lactams consumption rate in DDD / 1000 from 2009 to 2014 for enteral and parenteral forms

forms 9 names and remedies with both forms 1 medical remedy name. At all were used 12 antimicrobial active substances (**Table 1**). All of other beta lactams antibacterials are largely used as prophylactic antibiotics in surgery [10,11,12].

Table 1

The evaluated list of other beta lactams antibacterials and theirs DDD for parenteral (P) and enteral (O) forms of administration

ATC classification and International name of antibacterials	Route	DDD (g)
J01DB First-generation cephalosporins		
Cefalexinum	O	2
Cefazolinum	P	3
J01DC Second-generation cephalosporins		
Cefuroximum	O	0,5
Cefuroximum	P	3
Cefaclorum	O	1
J01DD Third-generation cephalosporins		
Cefotaximum	P	4
Ceftazidimum	P	4
Ceftriaxonum	P	2
Cefixim	O	0,4
Cefoperazonum	P	4
Cefoperazonum + Sulbactamum	P	4
J01DH Carbapenems		
Meropenemum	P	2
Imipenemum+Cilastatinum	P	2

Conclusions

1. From the evaluated period the other beta-lactam antibacterials demonstrated a increase usage rate from the total anual consumption by 17.9% (from 40.9% in 2009 to 58.8% in 2014). At the sa-me time anual consumption of this group of antibiotics remain in the middle around 270 DDD/1000.

2. Intake of enteral cephalosporins forms sin-ce 2009 till 2014 increased for G-I by 10.7 times,

G-II by 22.2 times, G-III by 4.3 times. For the whole group increase was form 2.2 to 25.3 DDD/1000 or by 11.5 times.

3. The consumption of parenteral forms of cephalosporin's G-I decreased by 2.45 times from 190.4 to 77.7 DDD/1000, but cephalosporin's G-II and G-III recorded an increase respectively by 2 times (from 61.5 to 122.8 DDD/1000) and 2.79 times (from 16.2 to 44.9 DDD/1000). The total consumption of the group registered a slight decrease from 268.5 to 247.3 DDD / 1000 or with 7.9%.

4. From the total consumption of other beta lac-tams antibacterials, parenteral forms rated 99.1% in 2009 and 90.7% respectively in 2014, and for enteral forms respectively 0.9% and 9.3%.

5. For providing antibacterial treatment in EMI in mentioned period were used 13 medical remedies for both enteral the parenteral administration, of whi- ch only enteral forms 3 names, only parenteral forms 9 names and remedies with both forms 1 medical re- medy name. At all were used 12 antimicrobial active substances.

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