

EVALUATION OF OTHER ANTIBACTERIAL CONSUMPTION IN EMERGENCY MEDICINE INSTITUTE

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Rezumat. Evaluarea consumului de alte antibacteriene în Institutul de Medicină Urgentă

Numai o evaluare a tuturor grupelor de antibiotice administrate pacienților spitalizați în instituție inclusiv în fiecare din subdiviziunile acestea poate evidenția obiectiv situația în utilizarea lor inclusiv și a grupei alte antibacteriene. Prezentul studiu a avut ca scop de a determina locul, a evalua consumul grupei menționate de antibiotice în principalele subdiviziuni ale IMU și a compara datele obținute cu altele similare din spitalele din mai multe țări ale lumii. În perioada evaluată, în IMU s-a înregistrat o reducere de la 61 până la 31.1 DDD/1000 ce constituie 49.02%, iar consumul mediu anual a fost de 38.32 DDD/1000, în subdiviziunile de asistență medicală intensivă medie a constituit 231.15 DDD/1000, iar în secțiile chirurgie și ortopedie-traumatologie septică de respectiv 39.67 DDD/1000. În același timp consumul mediu în spitalele din Australia a constituit 27.83, iar alte spitale internaționale respectiv 50.53 DDD/1000 fiind unul aproape de constant cu variații nesemnificative în perioada de evaluare. În anul 2014 costul dozelor definite pentru o 1000 mie de paturi ocupate în secțiile de asistență medicală intensivă a constituit 2153.3 lei și respectiv de 318.55 lei în secțiile septică de chirurgie și ortopedie-traumatologie, iar pe întreaga instituție de 442.72 lei.

Cuvinte-cheie: alte antibacteriale, doză definită de zi cu zi, consumul, utilizarea rațională, spitale

Summary

Only an assessment of all antimicrobial groups administrated to the patients in hospitals and their subdivisions can determine a clear picture of consumed antibiotics. Other antibacterial are not an exception. The study was designed to determine the place, analyze the use of other antibacterial in the most important departments of EMI and compare with consumption in some hospitals worldwide countries. In the evaluated period, in EMI was recorded a decrease from 61 to 31.1 DDD/1000 or by 49.02%, with the medium annual consumption or 38.32 DDD/1000 and respectively in ICD of 231.15 DDD/1000 as well as 39.67 DDD/1000 in SSOD departments. When, the yearly medium consumption in Australian hospitals as well as in others international hospitals was of 27.83 and of 50.53 DDD/1000 respectively. In 2014 was registered the cost of 2153.3 lei in ICD departments and respectively 318.55 lei per DDD/1000 in SSOD departments, as well as 442.72 lei per EMI. Consumption of other antibacterial drugs during 6 years in EMI recorded a considerable decrease in all many important departments as well as in the entire institution that fortunately is not confirmed by data from other international hospitals where dynamics of consumption of this group of antibiotics remains around the same.

Key words: other antibacterial, defined daily dose, consumption, hospitals

Резюме. Изучение показателей расхода препаратов группы другие антибактериальные средства в Институте Ургентной Медицины

Всестороннее изучение процесса расхода антибиотиков, как на уровне лечебного учреждения, так и для каждого отделения дает ответ на реальный расход в израсходование этой важной группы медикаментов. Цель данной статьи состоит в определении значения и изучении расхода упомянутой группы антибактериальных средств в ос-

новых отделениях ИУМ а также в сравнении полученных данных с данными расхода других лечебных учреждений соответствующего профиля других стран мира. За период изучения в ИУМ зарегистрировано снижение расхода с 61 до 31.1 ССД/1000, что составляет 49.02%, или 38.32 ССД/1000 среднегодовой расход. В основных подразделениях интенсивной медицинской помощи данных расход составил 231.15 ССД/1000, а в подразделениях гнойной хирургии и травматологии соответственно 39.67 ССД/1000. В то же время средний расход данной группы антибиотиков в австралийских госпиталях составило 27.83 ССД/1000 и соответственно 50.53 ССД/1000 в госпиталях других стран Европы, с небольшими отклонениями за период изучения. В 2014 году стоимость за ССД/1000 в основных отделениях интенсивной медицинской помощи составило 2153.3 лей, соответственно 318.55 лей в подразделениях гнойной хирургии и травматологии и 442.72 лей в целом по ИУМ.

Ключевые слова: другие антибактериальные средства, средние - суточные дозы, расход, рациональное использование, госпиталь

Introduction

Many surveillance consumption programs [1, 2, 3, 4, 5] and strategies [6, 7, 8, 9] are used to achieve a prudent use of antibiotics in medical care institutions and qualify anti-infective treatment of hospitalized patients. The share of other antimicrobials from all antibiotics consumption remains in majority of hospitals recorded 25 to 50 DDD/1000, [10, 11]. At the same time it is necessary to mention that up to 50% of antibiotic usage in medical institutions is inappropriate [12]. The primary aim of the study was to evaluate institutional representative data on other antibacterial utilization in accordance to World Health Organization (WHO) requirements, directed to determine value of Defined Daily Doses per 1000 Occupied-Bed Days (DDD/1000) and value cost in the dynamics per total institution and most important departments [13] and compare with the same published data in international scientific journals.

Material and methods

For this study we used the data of a six-year (2010-2014) period. DDD/1000 consumption of other antibacterial in EMI (Emergency Medicine Institute) and their main subdivisions as following ICD (Reanimation, intensive Therapy and intensive Neurological „STROKE”) departments and SSOD (septic Surgical and septic Orthotraumatology departments) which show the dynamics of consumption of anti-infective for systemic use drugs as classified by Anatomical Therapeutic Chemical (ATC), classification system of World Health Organization (WHO) indicated in grams and value indexes. Statistical, analytical, mathematical, comparative, logical and descriptive were used as the methods of study.

Results and discussion

For determining number of DDD/1000 we used data about total annual consumption of other antimicrobials and the statistics data concerning the number of treated patients (only patients with health insurance and other free treated by the state categories of citizens). 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, and respectively for the evaluated departments of EMI: Reanimation intensive care unit 2009 = 3990; 2010 = 6551; 2011 = 6985; 2012 = 9051; 2013 = 7384; 2014 = 7361), Therapeutic intensive care (2010 = 2922; 2011 = 3327; 2012 = 3239; 2013 = 3407; 2014 = 3388), “STROKE” intensive care (2013 = 2553; 2014 = 4193), septic Surgical (2009 = 14030; 2010 = 14212; 2011 = 12875; 2012 = 12372; 2013 = 12464; 2014 = 12104), septic Orthopedic-traumatology (2009 = 10664; 2010 = 10017; 2011 = 9540; 2012 = 10178; 2013 = 9701; 2014 = 9535) [14, 15, 16, 17].

Based on their antibacterial spectrum other antimicrobial are divided into generations [18] consumption of which in EMI is characterized by use of parenteral (P) and enteral (E) forms as following: glycopeptide antibacterials: vancomycin DDD 2.0 P, imidazole derivatives: metronidazole DDD 1.5 P, nitrofurantoin DDD 0.2 E, nitrofurantoin DDD 0.2 E, other antibacterials: dioxynium DDD 0.7 P, nitroxolin DDD 1.0 E.

Total other antibacterial consumption in DDD/1000 during 2009-2014 is shown in **figure 1**.

From figure 1 could be observed a light decrease during the evaluated period of the total consumption of other antibacterial for all departments from 607.5 in 2009 to 551.8 DDD/1000 in 2014 or by 9.3%. Calculation of annual medium consumption for every department and percentage from the total annual consumption (477.3 DDD/1000) of all departments in the evaluated period was placed as follows: first - intensive Therapy department with 244.42 DDD/1000 or 51.22%, second - Reanimation department with 167.7 DDD/1000 or 35.14%, third - intensive Neurological “STROKE” department with 88.31 DDD/1000 or 18.5%, fourth - septic Surgical department with 47.06 DDD/1000 or 9.86% and septic Orthotraumatology department with 29.35 DDD/1000 or 6.15% on the fifth position. In **figure 2** the total other antibacterial consumption of parenteral forms in DDD/1000 during 2010-2014 is shown.

Parenteral forms of other antibacterial

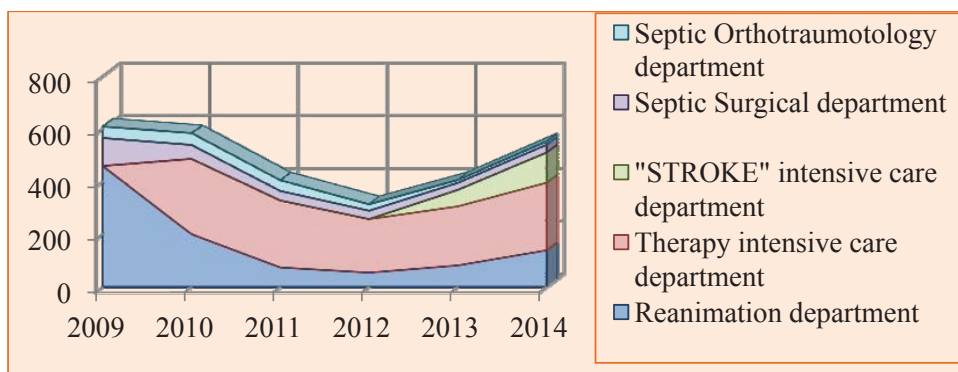


Fig. 1. Total other antibacterial consumption in DDD/1000 during 2009–2014

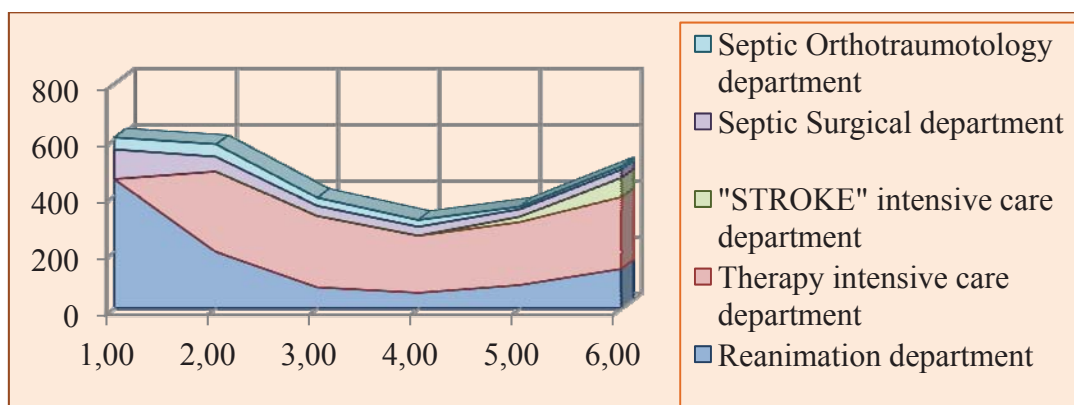


Fig. 2. Total other antibacterial consumption in DDD/1000 (parenteral forms)

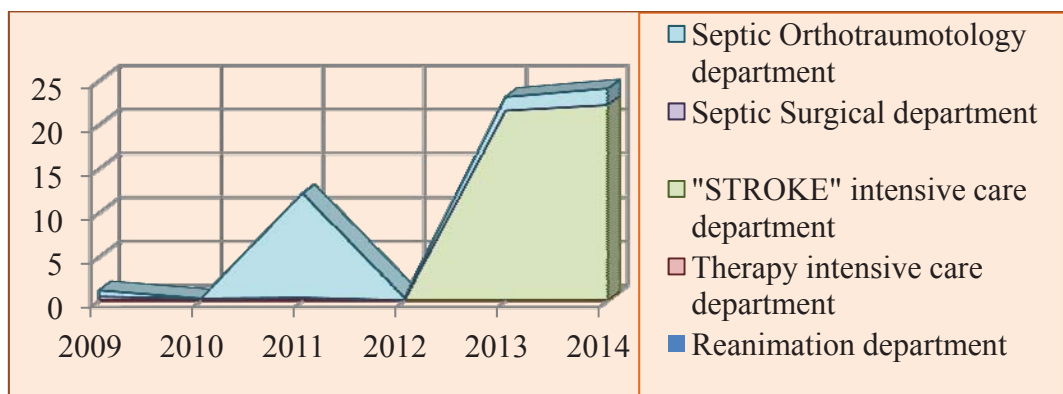


Fig. 3. Total other antibacterial consumption in DDD/1000 (enteral forms)

consumption records didn't change significantly and the spectrum of use is similar to the total consumption. In **figure 3** DDD/1000 of other antibacterial (enteral forms) consumption during 2009-2014 is shown.

Figure 3 shows that in the evaluated period, enteral forms of other antibacterial is characterised by consumption only in 3 departments and recorded a considerable increment from 1.14 in 2009 to 24.07 DDD/1000 in 2014 or by 21.11 times. Calculation of anual medium consumption for every department and procentage from the total medium anual consumption (25.44 DDD/1000) of all departments in the evaluated period is placed accordingly: first - intensive Neurological "STROKE" department with 21.87 DDD/1000 or 85.94%, second - septic

Orhtotraumatology department with 3.26 DDD/1000 or 12.8%, third - septic Surgical department with 0.32 DDD/1000 or 1.25%. To determine the medium consumption of other antibacterial DDD/1000 was counted the total of DDD/1000 separately for ICD and SSOD and divided to the number of those departments (3 and respectively 2). The results are shown in **table 1**.

The data in **table 1** shows that in the evaluated period consumption of DDD/1000 in IC departmentals of other antibacterial decreased by 61.5%, with P to E forms share from the medium yearly consumption of 87.94 and 12.06% and respectively in SSOD by 70.08%, with P to E forms share of 92.44 to 7.56%, as well as the total in EMI decreased by 40.08% and

Table 1

**Other antibacterial (parenteral and enteral forms) consumption of DDD/1000 in ICD
and SSOD departments of EMI**

Department	Administration /time	2009	2010	2011	2012	2013	2014	Procent 2009/ 2014	Medium yearly consumption
ICD	Parenteral	458.4	242.6	163.7	128.4	108.2	154.3	-66.3%	220.50
	Enteral					21.55	22.18	2.92%	124.79
	Total	458.4	242.6	163.7	128.4	129.7	176.5	-61.5%	229.40
SSOD	Parenteral	73.99	48.68	32.24	27.88	17.92	20.06	-72.9%	45.83
	Enteral	1.14	0.21	12.15	0.29	1.55	1.89	65.8%	58.13
	Total	75.13	48.89	44.39	28.17	19.47	21.95	-70.8%	49.41
Total EMI	Parenteral	50.9	44.1	30	24	24.8	35.1	-31.0%	57.80
	Enteral	10.1	6.5	1.9	1.5	0	1	-90.1%	6.80
	Total	61	50.6	31.9	25.5	24.8	36.1	-40.8%	58.04

P to E forms share of 90.87 to 9.13%. Consumption in ICD comparatively to SSOD departments in 2014 was $(231.15:39.67) = 5.84$ times more.

From table 2 could be observed that during the evaluated period consumption of other antibacterial in EMI recorded a decline from 61.1 to 36.1 DDD/1000 or by 40.92% and accounted to the yearly medium of 38.35 represents a share of 6.78% from the 6 years medium total of 566.02 DDD/1000. This data in large acute Australian public hospitals represents a slow increase from 25.2 to 27.59 DDD/1000 or by 9.48%, the yearly medium recorded 2.97% from the medium total of 937.22 DDD/1000 as well as in all others international hospitals indifferent periods of time the yearly medium use recorded 50.53 or 7.18% from the medium total of 704.21 DDD/1000. The total value cost of other antibacterial use per DDD/1000 in lei is presented in figure 4.

As could be observed from figure 4 during in the evaluated period, cost per DDD/1000 of other

antibacterial decreased in all departments from 7285.9 to 6984.4 lei or by 4.14%. The main yearly medium value cost of 3497 lei per DDD/1000 or 51.54% calculated from the medium total of all departments' cost of 6785.3 lei belongs to intensive Therapy department, second to Reanimation department with 2649.9 lei or 39.05%, third to intensive Neurological "STROKE" department with 752.83 lei or 11.10%, followed by septic Surgical department with 520.36 or 7.67% lei and the fifth position to Orthotraumatology department with 449.92 lei or 6.63%.

In figure 5 the total value cost other antibacterial in DDD/1000 (parenteral forms) is presented.

The cost of parenteral other antibacterial DDD/1000 for all departments remains approximately similar comparatively to total consumption because of low cost of enteral forms for DDD/1000. In figure 6 the value cost DDD/1000 in lei of other antibacterial enteral forms is shown.

The presented data in chart 6, demonstrates that

Table 2

Total DDD/1000 consumption of other antibacterial in EMI and some international hospitals

Institution/data/year			2009	2010	2011	2012	2013	2014	Medium
Emergency Medicine Institute			61.1	50.6	32.0	25.5	24.8	36.1	38.35
Total			662.4	558.2	622.1	542.4	546.9	464.1	566.02
Percentage			9.22%	9.07%	5.14%	4.7%	4.53%	7.78%	6.78%
Large acute Australian pub. hospitals [19,20]			25.2	26.4	29.8	29.0	29.0	27.59	27.83
Total			931.8	933.7	946.5	931.6	943.4	936.3	937.22
Percentage			2.70%	2.83%	3.15%	3.11%	3.07%	2.95%	2.97%
Other international hospitals	1997-2001	2007	2001-2012	2012		2012-2013	2013		50.53
Dutch acute care hospitals [21]	6.62								
530 French hospitals [22]		17.7							
University Hospital [23]			71.4						
DANMAP; SWEDRES				64.4	43				
NAUSP [19]						81.5			
SAAUSP; NETHMAP							68.6	51.0	
Total			503.4	359.3	631.0	931.0	609.0	945.0	704.21
Percentage			1.32%	4.93%	11.3%	6.92%	7.06%	8.82%	7.18%

in the evaluated period value cost of DDD/1000 for all departments increased from 8.57 to 86.11 lei or by 10.05 times. The medium total departments cost recorded 55.60lei. By the value cost of DDD/1000 the first position holds "STROKE" intensive care department with the medium annual cost per DDD/1000 of 28.14 lei or 50.61%, the second - septic Surgical department with 16.49 lei or 29.66%, the third - Orthotraumatology department with 7.79 lei or 14.01% and the forth - Therapy intensive department with 3.18 lei or 5.72%. To determine the medium cost of other antibacterial in DDD/1000 was counted the total cost of DDD/1000 separately for ICD and SSOD and divided to the number of those departments (3 and respectively 2) in the evaluated period.

As we could see from table 3 total cost of

DDD/1000 for other antibacterial in evaluated period recorded a decrease in ICD departments from 2913.20 in 2009 to 2097.01lei in 2014 or by 28.02% and respectively in SSOD departments from 729.87 to 318.55 lei or by 56.36%, as well as the total institutional cost decreased from 657.84 to 442.72 lei or by 32.70% and were 6.76 and 4.86 times less than recorded in ICU departments in 2014.

Conclusions

1. Consumption of other antibacterial in the evaluated period in EMI recorded a decline from 61.1 to 36.1 DDD/1000 or by 40.92% and the annual medium 38.35 DDD/1000 represents a share of 6.78% from yearly total institutional antibiotics medium use of 566.02 DDD/1000. The same data in large acute Australian public hospitals recorded 27.83 DDD/1000

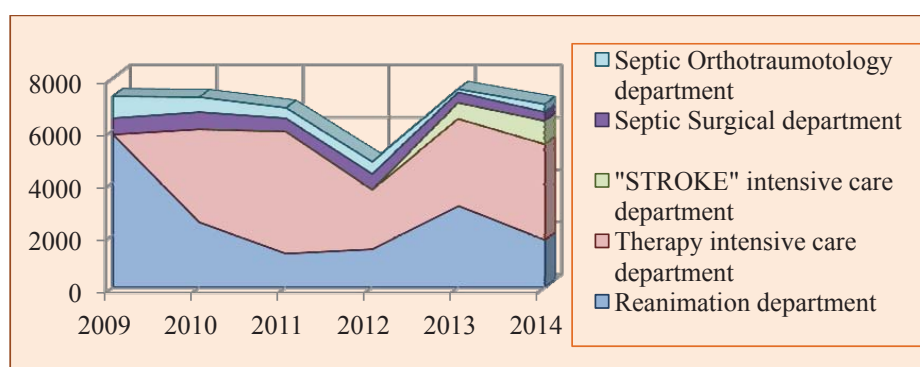


Fig. 4. Total value cost of other antibacterial per DDD/1000 in lei

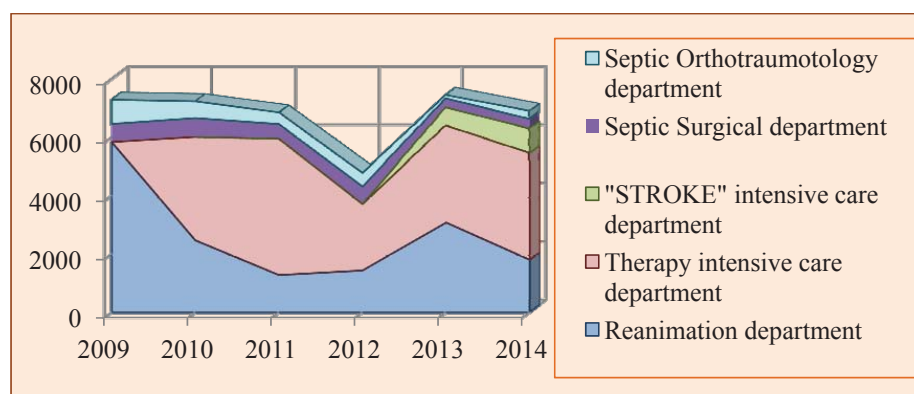


Fig. 5. Value cost of other antibacterial in DDD/1000 of parenteral forms in lei

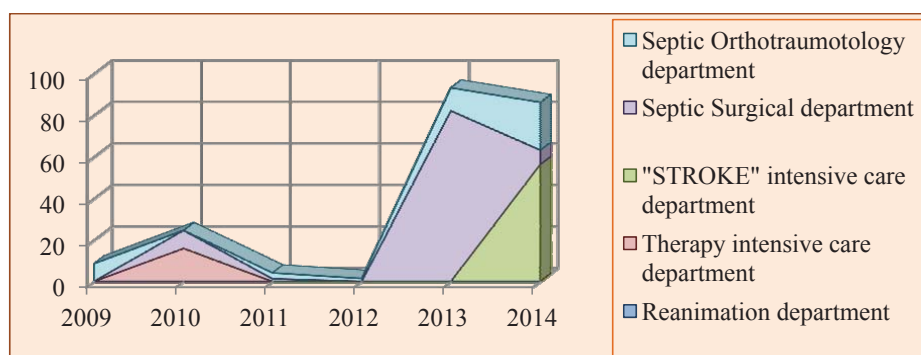


Fig. 6. Value cost of other antibacterial in DDD/1000 (enteral forms) in lei

Table 3

Medium cost of DDD/1000 in lei of other antibacterial (parenteral and enteral forms) in EMI

Department	Structure of consumption	2009	2010	2011	2012	2013	2014
ICD	Parenteral	2913.16	3000.96	2969.27	1850.84	2338.59	2097.01
	Enteral					15.89	56.28
	Total	2913.2	3001	2969.4	1856.3	2354.5	2153.3
SSOD	Parenteral	725.59	610.49	451.88	532.76	213.74	303.44
	Enteral	4.28	4.33	2.07	0.71	46.53	14.91
	Total	729.87	614.82	453.95	533.47	260.27	318.55
Total EMI	Parenteral	649.88	558.14	426.56	399.46	400.3	431.03
	Enteral	7.96	14.27	5.35	4.16	12.70	11.69
	Total	657.84	572.41	431.91	403.62	413.00	442.72
		657.84	572.41	431.91	403.62	413	442.72

or 2.97% from the medium total of 937.22 DDD/1000 as well as in all others international hospital in different periods of time 50.53 DDD/1000 or 7.18% from the yearly medium total of 704.21 DDD/1000.

2. From the total medium anual consumption of 477.3 DDD/1000 per all evaluated departments, the first place belongs to intensive Therapy department with 244.42 DDD/1000 or 51.22%, the second to Reanimation department with 167.70 DDD/1000 or 35.14%, third to intensive Neurological “STROKE” department with 88.31 DDD/1000 or 18.5%, the fourth to septic Surgical department with 47.06 DDD/1000 or 9.86% and septic the last to Orhtotraumatology department with 29.35 DDD/1000 or 6.15%.

3. The consumption in ICD departmentals of other antibacterial decreased from 458.39 in 2009 to 176.52 DDD/1000 in 2014 or by 61.5%, with the P and E forms share from the medium yearly consumption of 90.54 and 9.46% and respectively in SSOD from 75.13 to 19.47 DDD/1000 or by 70.08% with the P and E forms share of 92.44 to 7.56%, as well as the total EMI consumption decreased from 61 to 36.1 DDD/1000 or by 40.08%, with the P and E forms share of 90.87 and 9.13%. Consumption in ICD comparatively to SSOD departments and total EMI in 2014 was 5.84 and respectively 4.89 times more.

4. The total value cost of 318.55 lei per DDD/1000 in SSOD departments and total institutional was less by 6.76 and respectively 4.86 times than 2153.3 lei recorded in ICD departments in 2014.

5. The findings of this study would serve a significant support for hospitals to compare the data concerning antimycotics consumption with the international health care institutions and to optimize the planning necessities as well as to improve rational use of antimycotics.

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