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Patterns of antibacterials use in intensive care units

Padrões de utilização de antibacterianos em unidades de terapia intensiva

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ABSTRACT

Objective: To know and compare the patterns of antimicrobials use in intensive care units (ICUs) based on the Anatomical Therapeutic Chemical/Defined Daily Dose (ATC/DDD) system.

Methods: a prospective cohort study was conducted in three medical-surgical intensive care units, two of them in public hospitals and one in a private hospital. Simple random, independent samples of patients admitted from 10/2004 to 09/2005 to the selected intensive care units were used. The antibiotics use was assessed using the ATC/DDD system. The amount of antibacterials used in each intensive care unit, in grams, was transformed in daily defined dose (DDD). The number of DDDs was divided by the number of patient-days, multiplied by one thousand, to obtain the average density of consumption (DC) per thousand patient-days (DDD_{1000}).

Results: 1,728 patients-days and 2,918.6 DDDs were examined in the three intensive care units, corresponding to an average density of consumption of 1,689.0 DDD_{1000}. The median number of DDDs of antibiotics use in the public hospitals' intensive care units was significantly higher (p=0.002) versus the private hospital's intensive care unit. The consumption of antibiotics in the private hospital's intensive care unit (DC=2,191.7 DDD_{1000}) was significantly higher (p<0.001) versus the intensive care units of public hospitals (1,499.5 DDD_{1000}). The most used antibiotics groups in the three intensive care units were 3rd generation cephalosporins, penicillins/betalactamases inhibitors, carbapenems and fluorquinolones.

Conclusion: The pattern of antibiotics use in the three examined intensive care units was not uniform. The private hospital's intensive care unit used a significantly larger amount versus the public hospitals' intensive care units. Nevertheless, the most used antibiotics groups were similar in the three intensive care units.

Keywords: Epidemiologic measurements; Intensive care units; Anti-bacterial agents/administration & dosage

INTRODUCTION

Given the worsening of the bacterial resistance issue and the actual perspective of unavailable effective therapies for resistant bacteria, international institutions, governments and the civil society are engaged in the search of initiatives to fight the emergence and dissemination of resistant germs.[1-3] During the last two decades several actions have been in place,

with emphasis on bacterial resistance[4] and antibacterial consumption[2,5,6] monitoring. These actions main objectives are to know the resistance and antimicrobial use patterns, respectively. From this information, it was possible to set parameters which are useful to evaluate measures aimed to limit the bacterial resistance emergence and dissemination, and to improve antibacterials use.

In Brazil, bacterial resistance monitoring actions are incipient. We heard no news either from Government or institutions on initiatives aimed to know the pattern of antibacterials consumption in intensive care units (ICUs) based on the Anatomical Therapeutic Chemical/Defined Daily Dose (ATC/DDD) system,[7] as recommended by the World Health Organization (WHO) for medicinal products study.

This study objective was to know and to compare the patterns of antimicrobials use in general, not specialized, intensive care units from Brasilia, in the Brazilian Federal District, based on the ATC/DDD system.

METHODS

This was a prospective cohort study, conducted from October 1, 2004 to September 30, 2005. For the sake of convenience, we selected three non-specialized adult patients ICUs – being two of them in public hospitals (Hospital Regional de Ceilândia – HRC, and Hospital Regional de Taguatinga – HRT), and one in a private hospital (Hospital Santa Luzia – HSL). Around 10,000 patients are yearly admitted in each hospital, and in none of them are any transplant or oncology services.

The Secretaria de Estado de Saúde do Distrito Federal's Ethics Committee opinion nr. 046/2004 approved this study in August 31, 2004. An Informed Consent Form signature was not required.

Sample

The patients were independently randomized for each individual ICU. All patients admitted to the units during the study period were considered for inclusion. Consecutive patients' readmissions were computed when the discharge and admission dates were different. Patients with time of stay shorter than one hour, and those younger than 18 years-old, were excluded. Each sample included patient was followed until leaving the ICU either for discharge, transference or death.

The antibacterials consumption was the basis for the sample size calculation. From the HRT's pharmacy antimicrobials dispensing reports, the average daily defined dose consumption rate was estimated. Using the appropriate formula for sample size calculation in a continuous variable descriptive study[8] and considering a 95% confidence interval, a number of 32 patients in each ICU was found. For the public hospitals, 20% was added for eventual losses, reaching 40 patients. Due to larger admission numbers in the private hospital, this hospital's sample was tripled, plus 10% for possible losses, reaching 100 patients.

Variables

The patients admitted to the ICUs and included in the sample were divided according to the cause of admission in either clinical or surgical. When the admission did not mention a surgical procedure or a surgery-related incident, the patient was considered as clinical, or in contrary, surgical.

Nosocomial infection meant any infection acquired from the patient's admission on and identified during the hospital stay or after the discharge, when it could be related to the stay in the hospital environment or procedures during the hospital stay. For identification of hospital infections, the Centers for Disease Control and Prevention (CDC) criteria[9] were used, according to the National Nosocomial Infections Surveillance (NNIS) methodology.[10] All patients admitted to the ICU were monitored regarding urinary tract, pneumonia and blood stream infections.

In order to control for the clinical status of the patients admitted to the three ICUs and included in the sample, the severity was assessed using the Acute Physiology and Chronic Health Evaluation (APACHE II).[11]

Consumption of antibacterials was considered as the amount of drug product effectively used by the patient during the ICU stay. To verify the antibacterials consumption, the 2005 ATC/DDD system was used.[7] According to this system, the drugs are divided into different groups, according to the organ or organ system they act on and their pharmacological and therapeutic properties. The systemic antibacterials were included in the J01 code of the Anatomical Therapeutic Chemical, not including antifungals (J02), tuberculosis specific drugs (J04) and antivirals (J05). In the system measuring unit, the daily defined dose (DDD) is the mean daily maintenance dose for a given drug, used according to its main adult indication.

The antibacterial consumption was calculated in two different forms: by the DDD and prescription frequency. In the first, the antimicrobial amount in grams was divided by the corresponding DDD. Next, the number of patients-days was used as denominator, for the density or rate of consumption for patients-day. The density of consumption (DC) was multiplied times 1,000 to find the density of consumption per one thousand patients-day (DDD_{1000}). For analysis purposes, the data on antibacterials consumption were pooled by specific antibacterials and ICUs, to allow a comparison with the main published studies. The second calculation of antibacterials consumption was by the prescription frequency. For this, the number of patients with a given antibacterial prescribed was counted, and related with the number of patients with antibacterials prescription per ICU. The result was expressed as absolute numbers and percentage.

Procedures for the data collection

The main investigator visited regularly the ICUs. In the public hospitals, the visit was always within the first 24 hours of each patient's admission. From the patient's evaluation and medical chart notes, the admission was labeled as either as clinical or surgical, and the severity score was rated (APACHE II). During the ICU stay, the medical chart notes were evaluated to check, when an antimicrobial was prescribed, if it was effectively given, the dosage, via and frequency. In the private hospital, the visit was weekly. The admission classification, the severity score calculation (APACHE II) and the data on antibacterials consumption were retrieved from the unit's computed system.

Each patient's severity and antibacterials consumption information was transcribed to standard study-specific forms. The secondary data came from reports on nosocomial infection indicators from each institution's nosocomial infection control service and the bacterial sensitivity reports provided by the institutions' microbiology laboratories.

During the study period, the only effectively ongoing antibacterial use control measurement in the evaluated institutions was the form with the available drugs. There was no continued education program, antibacterials use restriction, empirical treatment for the most frequent infections routine, or even an infectologist physician support for the antibacterial therapy decision making process.

Statistics

For normal distribution continuous variables analysis, two tests were used: variance analysis (ANOVA) and the *t* test for independent samples. The variance analysis was conducted after the data distribution homogeneity around the mean analysis, using the Barlett test. For non-normal distribution continuous variables, non-parametrial tests were used (Kruskall-Wallis analysis). The rates comparisons were performed using the χ^2 test. A significance level of 5% was adopted. The data were stored and analyzed using the EPI INFO 3.3.2 (CDC, 2005), WINPEPI and WHONET 5.4 (WHO, 2007) softwares.

RESULTS

During the study period were admitted to the HRC, HRT and HSL ICUs 173, 115 and 106 patients, respectively. The candidates from these populations were randomized for inclusion in the sample. As the HRC and HSL number of admissions was surpassed before the time expected for the study end, new patients were randomized. Thus, the sample size initially expected for the hospitals, was increased.

In the HRC's ICU, 58 patients were randomized to the sample, and four (6.9%) were excluded: one staying shorter than one hour, and three below 18 years-old. Thus, the sample comprised 54 patients. In the HSL, 115 patients were randomized to the sample, and 12 were excluded: ten hat no rated APACHE II score, and two patients were admitted to the neurological ICU; 103 patients remained in the sample.

Overall, the patients in the three ICUs were not significantly different regarding age, gender and urinary tract infection and pneumonia rates, however significant differences were found regarding other aspects: clinical patients' rate, patients' origin, severity score, blood stream infection rate, antibacterial use frequency, hospital stay length and mortality (Table 1).

Pattern of antibacterials consumption

A total of 1,728 patients-days and 2,918.6 DDD were analyzed in the three pooled ICUs, corresponding to an average density of antibacterial consumption of 1,689.0 DDD_{1000}.

The median total DDD was significantly different between the ICUs, being higher in the public hospitals ICUs. On the other hand, the average density of antibacterial consumption was significantly higher in

the private hospital's ICU (Table 1).

The antibacterials groups which were 90% of the total amount used in the three ICUs, are listed on table 2 as DDD_{1000}. The most used antibacterials in the three ICUs, according to their average density of consumption, were similar and mainly characterized for being more recently launched drugs (e.g. penicillins/betalactamases inhibitors), drugs with wide antibacterial spectrum (e.g. 3rd generation cephalosporins and carbapenems) and resistant germs-targeted drugs (e.g. carbapenems and glycopeptides).

Although similar, the amount used of each of these antibacterials groups was not uniform among the ICUs, and somehow reflected the patients' characteristics regarding origin, severity and Gram-negative bacteria isolation from cultures frequency in the patients staying in the units during the study (data not shown). For instance, the average density of consumption for the penicillins/betalactamases inhibitors group was significantly higher in the private hospital ICU versus the public hospitals' ICUs (p<0.001); 3rd generation cephalosporins and fluorquinolones were more intensively used in the HRC and HSL (p<0.001), respectively. On the other hand, the carbapenems group, more intensely consumed in the public hospitals ICUs, did not show a difference in the average consumption for both units (p=0.828), although more used than in the private hospital's ICU (p=0.002).

Even not ranked first among the most consumed antibacterials, the aminoglicosides group had outstanding average consumption in the HRC and HSL. The same was seen for the lincosamides group in the HRC and HRT hospitals, and the sulfamethoxazole/trimethoprim combination in the HRC and HSL (Table 2). The use of these last two antibacterial groups was possibly related to the admission of intra-abdominal infection patients and patients with opportunistic acquired immunodeficiency syndrome-associated infections, respectively. Regarding their average density of consumption, were also noteworthy the glycopeptides group in the HRT and HSL, and de first generation cephalosporins group in the HSL (Table 2). For the glycopeptides, their use may be related to the increased frequency of

Table 1 – Overall patients' characteristics, according to the hospitalization site

Overall characteristics	HRC (N = 54)	HRT (N = 40)	HSL (N = 103)	P value
Age (years)	53.0±19.4	47.7±20.4	56.2±19.0	0.063
Male	29 (53.7)	19 (47.5)	55 (53.4)	0.794
Medical patient	36 (66.7)	29 (72.5)	53 (51.5)	0.035
Patients from				
Surgery room	6 (11.1)	9 (22.5)	48 (46.6)	
Emergency	16 (29.6)	10 (25.0)	23 (22.3)	
Ward	7 (13.0)	8 (20.0)	13 (12.6)	<0.001
External	25 (46.3)	13 (32.5)	11(10.7)	
Hemodynamics	0 (0.0)	0 (0.0)	8 (7.8)	
Severity score (APACHE II)	17.0	14.0	8.0	<0.001
Long term urinary catheter infection*	3.43±5.35	8.39±6.85	5.23±3.39	0.099
Pneumonia/mechanic ventilation rate*	10.26±4.03	13.97±10.47	14.62±5.19	0.312
Blood stream/central venous catheter infection*	2.83±4.56	12.13±5.73	3.27±2.66	<0.001
Antibacterials	44 (81.5)	34 (85.0)	69 (67.0)	0.034
Stay (days)	5.0	6.0	2.0	<0.001
Mortality	22 (40.7)	15 (37.5)	8 (7.8)	<0.001
Antibacterials consumption in DDD	5.3 (1.0-16.4)	7.3 (2.0-35,1)	2.3 (0.0-6.0)	0.002
Average density of antibacterials consumption	1,661.2 (500.0-1864.6)	1,383.3 (531.3-2000.0)	2,191.7 (0.0-2698.6)	<0.001

HRC - Hospital Regional de Ceilândia; HRT - Hospital Regional de Taguatinga; HSL - Hospital Santa Luzia; APACHE – Acute Physiological Chonic Health Evaluation; DDD – daily dose defined. Results expressed as mean ± standard deviation, median (25-75% percentile) or number (%). ANOVA test (parametrical data) or Kruskall-Wallis (non-parametrical data). *Calculation of the infection incidence rate associated with risk procedure. Rate = (NIH/Pdia) x 1000 Where = infection incidence rate (urinary infection, blood stream infection, pneumonia) associated with risk procedure (long term urinary catheter, central line catheter, mechanic ventilation), NIH = number of specific hospital infection (urinary infection, blood stream infection, pneumonia). Pdia = number of procedures (long term urinary catheter, central line catheter, mechanic ventilation)-day.

Table 2 – Average density of consumption and prescription frequency per antibacterial group, distributed by hospitals

Antimicrobial groups*	Average density of consumption[a]			Prescription frequency[b]		
	HRC	HRT	HSL	HRC	HRT	HSL
Penicillins/betalactamase inhibitors	350.7	304.4	694.9	8 (7.7)	9 (9.4)	20 (16.7)
3rd generation cephalosporins [c]	435.2	264.4	219.9	24 (23.1)	19 (19.8)	18 (15.0)
Carbapenems	250.1	256.9	175.1	20 (19.2)	16 (16.7)	6 (5.0)
Aminoglycosides	123.8	66.0	190.3	8 (7.7)	6 (6.3)	8 (6.7)
Glycopeptides	59.1	198.0	120.5	4 (3.9)	13 (13.5)	9 (7.5)
Fluorquinolones	65.9	43.6	200.4	5 (4.8)	7 (7.3)	14 (11.7)
Lyncosamides	167.1	108.6	33.2	12 (11.5)	8 (8.3)	3 (2.5)
Sulfamethoxazole/trimethoprim	78.1	2.7	184.4	4 (3.9)	1 (1.0)	1 (0.8)
1st generation cephalosporins	9.5	9.9	113.5	4 (3.9)	3 (3.1)	21 (17.5)
Other[d]	121.7	128.8	259.5	15 (14.4)	11 (11.5)	19 (15.9)
Total prescriptions	-	-	-	104 (100.0)	96 (100.0)	120 (100.0)

HRC- Hospital Regional de Ceilândia, HRT - Hospital Regional de Taguatinga, HSL - Hospital Santa Luzia. Results expressed as number (percent). *According to the system Anatomical Therapeutic Chemical/Defined Daily Dose (ATC/DDD); [a]Refers to the average density of consumption for each antibacterial group. It calculation is made by patient. It is the result of dividing the total number of defined daily doses for each antibacterial groups by each patient time of stay, times 1,000; [b]Refers to the number of times the antibacterial group was prescribed, and its relationship with the overall prescriptions; [c]As third generation Cephalosporins were included: cefipime, ceftazidime, and ceftriaxone, available in the three hospitals; [d]Other includes the following antibacterial groups: betalactamase sensitive and resistant penicillins (includes isoxazolpenicillins), 2nd generation Cephalosporins, aztreonam, macrolides, imidazols, oxazolidinone and polymyxin.

blood stream infection seen in the HRT, and the isolation of oxacyllin-resistant *Staphylococcus aureus* isolated in the HSL (data not shown). Regarding the 1st generation cephalosporins, their consumption was, probably, related to the frequency of elective surgeries in the hospital (data not shown).

The analysis of the antibacterials groups' frequency of prescription has shown important differences, when compared to the mean density of consumption (Table 2). For instance, the penicillins/betalactamases inhibitors group, the most consumed in the HRT and HSL according to the average density of consumption, is ranked second in the private hospital when the number of prescriptions is analyzed. The first generation cephalosporins group ranked eight in the private hospital when the evaluation considered the average density of consumption. However, when the number of prescriptions was evaluated, it became first; the lincosamides group, ranking fourth in the HRC according to the average density of consumption, ranked third according to the number of prescriptions (Table 2).

DISCUSSION

The patterns of antibacterials consumption in the three studied ICUs were not uniform. Nevertheless, the most used antibacterials groups used in the three ICU were similar.

Pattern of antibacterials consumption

Our results confirmed the findings of two recent independently conducted studies, involving two out the three ICUs analyzed in this study. The first was conducted from January 1999 to December 2004 in the Hospital Regional de Taguatinga (HRT)'s adult ICU and used medical charts data for a sample of hospitalized patients.[12] The average density of antibacterials consumption (1,487.1 DDD_{1000}) was similar to our findings for the HRT's ICU (1,383.3 DDD_{1000}) (Table 1). Regarding the most consumed antibacterials groups, a change was identified. The 3rd generation cephalosporins group, the most consumed group in the previous study, was surpassed by the penicillins/betalactamases inhibitors group in this one. However, we emphasize that this last antibacterials group was made available in public institutions from 2003 on, allowing its widespread use.

The second study was conducted in the Hospital Santa Luzia (HSL)'s ICU.[13] Data on antibacterials dispensed by the hospital pharmacy for all patients staying in the general ICU were used. The average density of antibacterials consumption dispensed was 1,918.5 DDD_{1000}, a value close to our findings

(2,191.7 DDD_{1000}) (Table 1). No change was seen regarding the most consumed antibacterials groups.

Comparison of the pattern of antibacterials consumption between the ICUs

When the severity in the public hospitals' ICUs is considered versus the private hospital's ICU, a larger consumption would be expected in the public hospitals, as expressed by the amount of antibacterials consumption in DDD (Table 1). On the other hand, the consumption expressed as average density, evidenced a larger antibacterials use in the private hospital's ICU (Table 1). This last result, increased average antibacterials consumption density in the private hospital, may be related to three aspects: the frequency of antibacterials prescriptions given; the difference between the daily defined dose and the effectively prescribed dose;[14] and the use of patients-day as denominator for calculation of the density or rate of antibacterials consumption.

Regarding the first aspect, the frequency of prescription, the private hospital's ICU has shown relevant differences versus the public hospitals' ICUs. For instance, the prescriptions of penicillins/betalactamases inhibitors group antibiotics in the private hospital's ICU was twice the prescriptions in the public hospitals (Table 2). Is association with the different frequencies of antibacterials prescriptions, some aspects of the measurement unit (DDD) in this study, as pointed in the previous paragraph, may explain the larger density of consumption in the private hospital's ICU. DDD is a technical measurement which allows to estimate the consumption, independently of the pharmaceutical form and product price. However, it does not necessarily reflects the effectively used dose.[14] On the other side, DDD has some disadvantages, as it does not translate the use of the products in children, renal failure patients, as well as prophylactic use.[15] In addition, for some antibacterials classes, there are important differences between the daily defined dose and the effectively prescribed dose, eventually overestimating the antibacterial amount used.[14] For instance, in the private hospital's ICU, the average density of consumption of penicillins/betalactamases inhibitors was significantly higher than in the public hospitals' ICUs (Table 2). Ampicillin/sulbactam was the most used antibacterial, particularly in the private hospital's ICU (data not shown). The DDD for the Ampicillin/sulbactam combination is 2 grams/daily, however this product was used in a 12 grams/daily dose – six times bigger than the DDD.[14] Thus, with the increased Ampicillin/sulbactam use, the average density of antibacterials consumption was overestimated in that institution (Table 1), explaining, at least in part, the increased density of consumption in the private hospital's ICU.

Adding to the two above factors to explain the increased average density of antibacterials consumption in the private hospital's ICU, we should take into consideration the denominator used for measuring the antibacterials consumption. Expressing the antibacterials consumption as DDD per patients-day (or beds-day) is believed to allow the drugs comparison between the institutions, independently of the formulary differences, antibiotics potency and hospital census. However, this consumption measurement may be influenced by the denominator used. When the time of stay in the institution was significantly different (Table 1), the one with shorter time of stay will have its consumption measurement overestimated, as seen in this study.[16]

Aspects regarding the ICUs' peculiar environments and technical management issues for the studied units may have contributed to the similarity between the three ICUs most used antibacterials groups. Among the first ones, the patients' severity and the need of effective therapy to minimize the risk of death, the frequency of bacterial resistance and the relatively restricted number of antimicrobials effective against resistant organisms, leave little options for initial infections therapy.[17] In case of Gram-negative bacteria, the most frequently isolated organisms in the studied ICUs during the study period (data not shown), are left the carbapenems, 3rd generation cephalosporins and fluorquinolones. For Gram-positive bacteria, are left glycopeptides and, more recently, oxazolininones. Regarding the technical management, the difficulties for implementation and maintenance of a full and effective antibacterials control policy, in compliance with the literature[18] may contribute to the similarity of antibacterials groups use between the ICUs.[19]

Comparison of the pattern of antibacterials consumption and the literature

The studies using the ATC/DDD system on ICU antibacterials consumption are relatively recent, starting during the last decade. The main English articles are concentrated in Europe (Sweden and Germany) and United States of America. These studies results comparison with our results has a number of limitations, as they were conducted in developed nations with ongoing programs against bacterial resistance. Additionally, the institutions voluntarily comply with the program, and most are major hospitals, linked to universities. Another aspect limiting this comparison is the time of the study conduction, as the pattern of antibacterials consumption changes with time.

The values of the average and median density of antibacterials consumption in the three analyzed ICUs were above those found in local counties hospitals' ICUs and regional Swedish hospitals (983 DDD_{1000} to 1,541 DDD_{1000})[6,20] and inter-disciplinary ICUs in Germany (1,093 DDD_{1000} to 1,338.3 DDD_{1000}).[21,22]

In the Swedish studies, where oxacyllin-resistant *Staphylococcus aureus* isolation is relatively rare, 2nd generation cephalosporins, isoxazolpenicillins and carbapenems were the most used antibacterials groups.[6,20] In Germany, starting from the last SARI (Surveillance of Antibiotic Use and Resistance in Intensive Care) project publication, it was seen that the most used antibacterials groups in 14 inter-disciplinary ICUs were penicillins/betalactamases inhibitors, 2nd generation cephalosporins and quinolones.[22] In the United States of America, the most used antibacterials groups in 61 medical-surgical ICUs were fluorquinolones, the Ampicillin group (including aminopenicillins either or not combined with betalactamases inhibitors and excluding anti-pseudomonas penicillins either or not combined with betalactamases inhibitors) and 3rd generation cephalosporins.[23]

The most used antibacterials groups in this study analyzed ICUs are different in variable degrees of the most used antibacterials in German and American ICUs. Compared to the Swedish ICUs, the patients in our study analyzed ICUs used broader spectrum antibacterials, favoring resistant germs selection. Regarding the German ICUs, our ICUs most used antibacterials did not include the 2nd generation cephalosporins. Regarding the American ICUs, there were no substantial differences when the most used antibacterials groups were compared.

Articles from other countries such as Denmark,[24] Swiss,[25], Italy[26] and Israel[27] evaluated the consumption of antibacterials in ICUs. However, these papers did not state if general, medical-surgical or inter-disciplinary ICUs were included, rendering a more consistent comparison difficult.

Study limitations

This study main limitations were the small number of ICUs and these units choice-by-convenience, thus reducing the possibility of generalization. Another limitation regards the use of DDD as the main measurement unit for antibacterials use quantification. In patients staying in the ICU, for instance, generally more severely ill than those staying in other hospital departments, some antibacterials may be used in daily doses not reflected by the DDD, resulting in distorted estimation of the actually consumed amounts.

CONCLUSION

The patterns of antibacterials consumption in the three ICUs analyzed in this study were not uniform. While the median of the total number of DDDs was significantly higher in the public hospitals' ICUs, the average density of consumption was significantly higher in the private hospital's ICU. Nevertheless, the most used antibacterials groups in the three ICUs were similar, and characterized for being more recently launched, having wider spectrum and being resistant-germs targeted drugs.

Compared to the international patterns, the ICUs analyzed in our study used more antibacterials, according to the average density of consumption. The most used antibacterials groups in our ICUs were more markedly different from those in Swedish ICUs, which were generally narrow spectrum antibiotics. The differences were less marked when compared to German ICUs, and the most used antibacterial groups were similar to the American ICUs.

RESUMO

Objetivo: conhecer e comparar os padrões de consumo de antibacterianos em unidades de terapia intensiva com base no sistema *Anatomical Therapeutic Chemical/Defined Daily Dose* (ATC/DDD).

Métodos: estudo de coorte, prospectivo, realizado em três unidades de terapia intensiva médico-cirúrgicas, duas localizadas em dois hospitais públicos e uma em hospital privado. Amostras aleatórias simples, independentes, dos pacientes internados nas unidades de terapia intensiva no período de 10/2004 a 09/2005 foram utilizadas. O consumo de antibacterianos foi avaliado com o sistema ATC/DDD. A quantidade utilizada de antibacteriano nas unidades de terapia intensiva, em gramas, foi transformada em dose diária definida (DDD). O número de DDD foi dividido pelo número de pacientes-dia e multiplicado por mil, compondo a densidade média de consumo por mil pacientes-dia (DDD_{1000}).

Resultados: Hum mil setecentos e vinte e oito (1.728) pacientes-dia e 2.918,6 DDD foram analisados nas três unidades de terapia intensiva, correspondendo a densidade média de consumo de 1.689,0 DDD_{1000}. A mediana do número de DDD referente à utilização de antibacterianos nas unidades de terapia intensiva dos hospitais públicos foi significativamente maior (p=0,002) do que na unidade de terapia intensiva do hospital privado. Ao contrário, a densidade de consumo de antibacterianos na unidade de terapia intensiva do hospital privado (2.191,7DDD_{1000}) foi significativamente maior (p<0,001) do que nas unidades de terapia intensiva dos hospitais públicos (1.499,5DDD_{1000}). Os grupos de antibacterianos mais utiliza-

dos nas três unidades de terapia intensiva foram cefalosporinas de 3ª geração, penicilinas/inibidores de betalactamases, carbapenêmicos e fluorquinolonas.

Conclusão: os padrões de consumo de antibacterianos nas três unidades de terapia intensiva analisadas não foram uniformes. A unidade de terapia intensiva do hospital privado utilizou quantidade significativamente maior, em termos de densidade de consumo, do que as unidades de terapia intensiva dos hospitais públicos. Apesar disso, os grupos de antibacterianos mais utilizados nas três unidades de terapia intensiva foram semelhantes.

Descritores: Medidas em epidemiologia; Unidade de terapia intensiva; Agentes antibacterianos/administração & dosagem

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