Effect of Prophylactic Use of Antibiotics in Class I Incision Operation and Nursing Analysis

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Resumen

A través de la investigación de una gran muestra de datos de CPMS, se encuentra que hay muchos fenómenos irracionales en la aplicación profiláctica de antibióticos en la cirugía de incisión de clase I, como una indicación poco clara del uso de fármacos, un punto de partida demasiado alto de la aplicación profiláctica de antibióticos, incorrecto tiempo y existencia de uso combinado de fármacos. La selección de antibióticos debe basarse en los tipos de patógenos comunes, los tipos de incisión y los factores de susceptibilidad de los pacientes. En principio, deberíamos elegir un fármaco antibacteriano de espectro relativamente amplio, efectivo, seguro y relativamente económico, la cefalosporina es la más adecuada para las condiciones anteriores. Entre los 15 tipos de antibióticos con alta tasa de utilización, hay 3 tipos de cefalosporinas de segunda generación: cefmendor dipivoxil, cefenicilina y cefotiam. En términos de los 10 departamentos principales en la tasa de uso de antibióticos en la cirugía de incisión de clase I, la selección de antibióticos también se basa en las cefalosporinas de primera y segunda generación. Debido al bajo precio de tales medicamentos, el costo de los medicamentos para los pacientes generalmente se reduce.

Palabras clave: Farmacia clínica; Uso racional de drogas; Antibióticos; Operación de incisión de clase I

Abstract

Through the investigation of large sample data of CPMS, it is found that there are many unreasonable phenomena in the prophylactic application of antibiotics in class I incision surgery, such as unclear indication of drug use, too high starting point of prophylactic application of antibiotics, incorrect administration time and the existence of combined drug use. The selection of antibiotics should be based on the types of common pathogens, the types of incision and the susceptibility factors of patients. In principle, we should choose a relatively broad-spectrum, effective, safe and relatively low-cost antibacterial drugs, cephalosporin is the most suitable for the above conditions. Among the 15 kinds of antibiotics with high utilization rate, there are 3 kinds of second generation cephalosporins: cefmendor dipivoxil, cefenicilina and cefotiam. In terms of the top 10 departments in the use rate of antibiotics in class I incision surgery, the selection of antibiotics is also based on the first and second generation cephalosporins. Because of the low price of such drugs, the drug cost of patients is generally reduced.

Key words: Clinical pharmacy; Rational use of drugs; Antibiotics; Class I incision operation

1. Introduction

With the development of medical science and the emergence of new drugs, irrational drug use and adverse drug reactions lead to a large number of drug-induced diseases[1]. Clinical unreasonable use of drugs has become an important factor affecting the quality of medical treatment. Research shows that the use of information automation to review prescriptions and medical records can reduce 3 / 4 of medication errors[2]. Pass (prescription automatic screening system) is a kind of drug database software system, which is specially used for doctors, pharmacists and other medical professionals to carry out real-time monitoring and drug information inquiry on prescriptions or orders. It can realize drug information inquiry and patient medication education, and play a certain role in the safety, economy and effectiveness of patients' medication. Due to the limitation of programming technology, the previous pass system could not integrate the required information organically, and could not apply the drug review order to the prescription and medical order management like the pharmaceutical management system of some foreign countries, so it could only play a prompt role for doctors, especially for some matching[3].
The function of forbidding prescription and doctor's advice to some people's taboo drugs does not really reflect the effective clinical pharmaceutical service function, nor can it meet the higher requirements of the Ministry of health for rational use of drugs in hospitals[4].

The new clinical pharmacy management system (CPMS) is a new generation of database application software specially developed for clinical pharmacy based on pass system[5]. Relying on this software system, medical institutions can develop personalized use methods based on CPMS system according to their own characteristics, so as to carry out standardized research on high-quality prescription reviews and realize electronic medicine. The establishment and application of the calendar will promote the rational use of antibiotics and the related research of pharmacoeconomic evaluation, so as to realize the clinical value of pharmaceutical management. This kind of CPMS has set up a regulatory mechanism for the high-risk medical prescription system, at the same time, it has also set up a green barrier, increased the prescription safety factor, and put forward warnings and suggestions for the compatibility problems with clinical significance[6]. At the same time, it has the information function of professional pharmaceutical Dictionary of online service, which is convenient for doctors to use when they give orders[7]. The new compatibility data analysis system greatly facilitates doctors to understand drug knowledge and select drugs, and realizes the real effective clinical pharmaceutical service means, which is more convenient and efficient for doctors to use.

In order to implement the guiding principles for clinical application of antimicrobial agents and the 2011 national plan for special treatment of clinical application of antimicrobial agents issued by the Ministry of health, to understand the current situation of prophylactic application of antimicrobial agents in class I incision surgery in our hospital, to promote the rational application of antimicrobial agents in our hospital, to strengthen the management of antimicrobial agents, to standardize the prophylactic application of antimicrobial agents in perioperative period and to establish effective Intervention mechanism, using CPMS to screen and count all inpatients in our hospital. With the deepening of our hospital's supervision on antimicrobial drugs, especially since July 2011, a series of regulatory documents for the rational use of antimicrobial drugs have been issued, and CPMS has been used to strictly review doctors' prescriptions, which is conducive to control the abuse of antimicrobial drugs. In order to understand the results and trends of rational use of antibiotics, the use of antibiotics in class I incision patients in our hospital was analyzed[8].

2. Data and methods

2.1 General information

From October 2016 to October 2018, there were 33329 inpatients in our hospital; 22842 patients with class I incision surgery were statistically obtained, including 20603 patients with prophylactic application of antibiotics[9].

2.2 Investigation content

Patient data: name, gender, age, medical record number, length of stay, diagnosis, operation name, operation date, operation start time, operation end time; medication: name, dosage form, dosage, usage and dosage, start and end date of medication, preoperative medication time, postoperative medication time.

2.3 Statistical tools and methods

Using oneway ANOVA software for statistical analysis and mapping.

3. Results

3.1 General information

There were 22842 patients with class I incision operation, 13819 male (60.50%), 9023 female (43.4%)[10]; the oldest 80 years old, the youngest 0.7 years old, the average 40.6 years old; the longest operation duration was 384 minutes, the shortest 23 minutes; 66 patients with operation duration > 3 hours, the average operation duration was 94 minutes; the longest hospital stay was 74 days, the shortest hospital stay was 3 days, the average hospital stay was 11.9 do.

3.2 Application of antibiotics

Among the 22842 patients with class I incision operation, 20603 patients were given prophylactic antibiotics, and the rate of using antibiotics was 90.20%[11]. See Table 1 for the variety, frequency and composition ratio of antibacterial drugs.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Number of cases</th>
<th>Constituent ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefodixin Sodium Injection</td>
<td>5324</td>
<td>25.84</td>
</tr>
</tbody>
</table>
3.3 Administration time

5894 cases (28.61%) were administrated 30 minutes to 2 hours before operation, 1452 cases (7.05%) were administrated more than 2 hours before operation, 13257 cases (64.34%) were administrated antibiotics before and after operation without preventive drugs, 5647 cases (27.41%) were administrated less than 24 hours after operation, 2608 cases (12.66%) were administrated more than 24 hours and less than 72 hours after operation, 5002 cases (24.28%) were administrated more than 48 hours after operation, and the combination was used 2505 cases (12.16%) were treated [12].

3.4 Use of antibiotics in different departments

All patients with class I incision surgery come from surgery, and the top 10 departments in the use rate of antibiotics are shown in Table 2.

Table 2. The top 10 departments in the order of antibiotics utilization rate in class I incision surgery

<table>
<thead>
<tr>
<th>Department</th>
<th>Number of cases</th>
<th>Number of cases using antibiotics</th>
<th>Antimicrobial use rate /%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric Surgery</td>
<td>277</td>
<td>271</td>
<td>97.83</td>
</tr>
<tr>
<td>Urology Surgery</td>
<td>454</td>
<td>443</td>
<td>97.58</td>
</tr>
<tr>
<td>Oral Surgery</td>
<td>784</td>
<td>754</td>
<td>96.17</td>
</tr>
<tr>
<td>Gastrointestinal Surgery</td>
<td>941</td>
<td>883</td>
<td>93.84</td>
</tr>
<tr>
<td>Thoracic Surgery</td>
<td>797</td>
<td>727</td>
<td>91.22</td>
</tr>
<tr>
<td>Gynecology Area C</td>
<td>762</td>
<td>652</td>
<td>85.66</td>
</tr>
<tr>
<td>Hepatobiliary surgery</td>
<td>857</td>
<td>713</td>
<td>83.20</td>
</tr>
<tr>
<td>Department of ENT</td>
<td>984</td>
<td>788</td>
<td>80.08</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>623</td>
<td>477</td>
<td>76.57</td>
</tr>
<tr>
<td>Gynecology Area A</td>
<td>575</td>
<td>416</td>
<td>72.35</td>
</tr>
</tbody>
</table>

3.5 Intervention results of CPMS on the use of antibiotics

Statistics are made on the use of antibiotics in class I incision surgery in the whole hospital and all clinical departments in three time periods. See Table 3 for the top three departments in the use rate and utilization rate of antibiotics in each time period.

Table 3. Top 3 departments in terms of the utilization rate and utilization rate of antibiotics in the hospital in 3 time periods

<table>
<thead>
<tr>
<th>Time</th>
<th>Utilization rate /%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Whole hospital</td>
</tr>
<tr>
<td>2016 year</td>
<td>99.28</td>
</tr>
<tr>
<td>2017 year</td>
<td>78.71</td>
</tr>
<tr>
<td>2018 year</td>
<td>48.82</td>
</tr>
</tbody>
</table>
3.6 Multi factor analysis results

By multivariate logistic regression analysis, the results showed that gender, age and operation time were the independent risk factors (P < 0.05), or values were 3.307, 1.207 and 1.060, respectively, as shown in Table 4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>P value</th>
<th>OR value</th>
<th>95% CZ of OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1.196</td>
<td>0.380</td>
<td></td>
<td>9.906</td>
<td>0.002</td>
<td>3.307</td>
</tr>
<tr>
<td>Age</td>
<td>0.076</td>
<td>0.008</td>
<td></td>
<td>10.636</td>
<td>0.000</td>
<td>1.207</td>
</tr>
<tr>
<td>Duration of operation</td>
<td>0.006</td>
<td>0.003</td>
<td></td>
<td>5.154</td>
<td>0.023</td>
<td>1.060</td>
</tr>
<tr>
<td>Constant</td>
<td>-7.172</td>
<td>0.666</td>
<td></td>
<td>116.123</td>
<td>0.000</td>
<td>0.004</td>
</tr>
</tbody>
</table>

4. Discussion

4.1 Advantages of CPMS for rational application of antibacterial drugs

The development and application of CPMS in our hospital is the first use of the system in China[13]. There is no experience to learn from. Based on this, CPMS can realize the personalized management applicable to our hospital, optimize it to become the same standardized management applicable to other hospitals, and fill in the gap of clinical pharmacist work information management in China. It is different from the previous pharmacist's work model[14]. It can complete the analysis and transformation of massive data, making the complex statistical process easy to operate in the background. It is mainly used in the following work in our hospital: (1) Complete the standardization research of high-quality prescription review; (2) Realize the establishment and application of electronic drug calendar in our hospital; (3) Develop a suitable and nationwide promotion Clinical pharmacist system; (4) Research on clinical pharmacy related topics based on clinical pharmacy management system, such as high-quality analysis of rational use of antibacterial drugs, rational use of drugs for special groups, case analysis of adverse drug reactions, and formulation of corresponding management scheme for irrational use of drugs in combination with hospital and clinical department system.

4.2 Medication characteristics of class I incision operation and general situation of our hospital

According to crude statistics, the incidence of type I incision infection is 1%, clean contaminated incision is 7%, contaminated incision is 20%, and seriously contaminated infected incision is 40%[15]. The exact classification is usually made after the operation, but the surgeon should make a prediction before the operation, as an important basis to decide whether the prophylactic application of antibiotics is necessary. Only the patients with serious infection consequences, such as cleaning operation, long operation time, large trauma and high risk factors of infection, can use antibiotics. The utilization rate of antibiotics in the cases analyzed in this paper is 90.20%, which is significantly higher than the regulations of the Ministry of Health[16]. Except for 66 cases with long operation time, 244 Cases with older age, 147 cases with younger age and high risk of postoperative operation, most of the cases have unknown indications of drug use. Among them, 12.16% of the cases used antibiotics in combination, as a preventive drug for class I incision surgery, the combination of drugs is unnecessary and without clear basis.

4.3 Variety selection of prophylactic antibiotics

The selection of antibiotics should be based on the types of common pathogens, the types of incision and the susceptibility factors of patients. In principle, we should choose a relatively broad-spectrum, effective, safe and relatively low-cost antibacterial drugs, cephalosporin is the most suitable for the above conditions. It can be seen from table 1 that among the 15 kinds of antibiotics with high utilization rate, there are 3 kinds of second generation cephalosporins (ceftmendor dipivoxil, cefenician, cefotiam), 6 kinds of third generation cephalosporins (cefidolin, ceftazidime crotch, Cefoperazone / tacobactam, Cefpiramide, raoxifen, cephalosporin, ceftriaxone), 1 kind of carbapenems (meropenem), 2 kinds of penicillins (flurochlor) Xilin, sulbacillin, 1 fluoronorone (levofloxacin), 1 macrocyclic lipid (azithromycin).

Staphylococcus is the main infection pathogen in thoracic surgery and orthinolaryngology, and the first generation cephalosporin is generally preferred[17]; the third generation cephalosporins, such as ceftriaxone and ceftriaxone, can be used in pediatric surgery, urology and emergency surgery, which are relatively complex and easy to cause infection; anaerobic bacteria are often polluted in sterilization surgery, gynecology and oral surgery, and anaerobic bacteria must be covered at the same time Generally, metronidazole for anaerobes is added to the second and third generation cephalosporins; ceftriaxone, cefoperazone or Cefoperazone / sulbactam with high concentration can be selected for hepatobiliary surgery.

The results of this investigation show that the most frequently used prophylactic drugs are not the first generation cephalosporins, but the third generation cephalosporins are the main ones, and the starting point is obviously too high; 15.17% of the cases choose the second generation cephalosporins; 51.08% of the cases
choose the third generation cephalosporins; 6.42% of the cases choose levofloxacin, which has a high resistance rate to gram-negative bacilli, so it is generally not suitable for use as a drug Prophylactic drugs, unless the drug sensitivity test is effective; 1-82% of the cases selected azithromycin, which is a bacteriostatic rather than a bactericide, and is not suitable for prophylactic drugs; 10.01% of the cases selected meropenem, meropenem is suitable for severe infection of multiple resistant gram-negative bacilli, and co infection of aerobic bacteria and anaerobic bacteria, so this kind of drugs The choice of starting point is also on the high side.

4.4 Time of prophylactic application of antibiotics

According to the guidelines for clinical application of antibiotics, the effective coverage time of antibiotics should include the whole operation process and 4h after the operation[18]. The total preventive medication time should not exceed 24h, and in some cases, it can be extended to 48h. The results of this investigation showed that 28.61% of the patients were given medicine 30 minutes to 2 hours before operation, 27.41% of the patients were given medicine less than 24 hours after operation, which was rational medicine; 24.28% of the patients were given medicine more than 2 hours before operation and more than 48 hours after operation, which was unreasonable medicine. We need to improve the time of preventive medication in class I incision operation.

4.5 Improvement of the application of antibiotics in class I incision surgery in our hospital since the implementation of special treatment activities

Since 2011, the national special campaign for clinical application of antibacterial drugs was launched, our hospital has officially implemented the new catalogue of antibacterial drugs and relevant regulations on rational use from July 2011. The number of antibacterial drugs has been reduced from more than 100 to 46. Each antibacterial drug has its own right of use. Doctors with different titles have restricted its use of antibacterial drugs with different rights, and rely on CPMS to over grade Doctors who use and use antibiotics unreasonably should be investigated and punished. Since July 2011, the rate of prophylactic use of antibiotics in class I incision surgery has declined rapidly from 78.71% in the first half of the year to 48.82%[19]. The rate of use of antibiotics in the top 10 departments where the rate of use of antibiotics in class I incision surgery has remained high has generally declined, while the rate of use of antibiotics in the top three departments ranked by the three time intervals has generally declined by 10% Right. In terms of drug selection, the Ministry of pharmacy has limited the number of varieties of antibacterial drugs, kept the national basic drugs, and restricted the authority of doctors[20]. Therefore, the selection of drugs has basically met the requirements specified in the guidelines for the prevention and application of antimicrobial drugs in perioperative period. From the perspective of the top 10 departments ranking in the utilization rate of antimicrobial drugs in class I incision surgery, the selection of antimicrobial drugs is basically the first The second generation cephalosporins are mainly used. Because of their low price, they generally reduce the drug cost of patients.

In order to reduce or avoid the incidence of SSI, nurses can strengthen the prevention and control from the following aspects: (1) Strengthen the management of the operating room and ward environment, and control the temperature, humidity, dust particles, microbial concentration and the number of people in the operating room within the standard requirements. Standardize the layout of operating room and drug exchange room, and ensure the rationality of functional process of personnel and articles. (2) Before operation, strengthen the preparation of patients' skin, clean or bathe according to the requirements to ensure the cleanness of the skin in the operation field; correctly select the skin preparation method to avoid damaging the skin around the operation field, leading to the growth of microbial colonization. (3) Standardize the management of implant materials and related external devices, strictly implement the cleaning disinfection sterilization procedure, and the external devices must be cleaned and sterilized in time before they can be reused to ensure the cleaning and sterilization quality. (4) During the operation, strict aseptic technology operation and protective isolation shall be carried out to reduce the pollution from the patient's own deep tissue or medical personnel or equipment, and eliminate all opportunities to increase the patient's infection. (5) Strengthen the training of specialized nurses in the operating room, so that they can be familiar with the working process and all kinds of specialized surgical procedures, so as to accurately and closely cooperate with anesthesiologists and specialized doctors, so as to shorten the operation time of patients. Some infection risks caused by patients' own factors cannot be changed. For patients with these high-risk factors, we should actively treat chronic diseases, improve the surgical skills of specialized surgeons, and persuade male patients to quit smoking and alcohol, so as to minimize the incidence of SSI. The ultimate goal is to reduce the infection mortality of patients and save medical and health resources.

5. Conclusion

Through the investigation of large sample data of CPMS, it is found that there are many unreasonable phenomena in the prophylactic application of antibiotics in class I incision surgery, such as unclear indication of drug use, too high starting point of prophylactic application of antibiotics, incorrect administration time and the existence of combined drug use. The medical staff of the whole hospital strengthened the guiding principles for
clinical application of antibacterial drugs and the notice of the general office of the Ministry of health on issues related to the management of clinical application of antibacterial drugs, and the hospital pharmaceutical management committee formulated and implemented a series of relevant regulations that strictly require the rational use of antibacterial drugs, and CPMS can provide reasonable guidance for doctors to use antibacterial drugs, and the restrictions are inconsistent. Rational use, so from the overall trend, our hospital has made gratifying progress in the rational use of antibacterial drugs.

After the use of CPMS, the clinical pharmacist system of our hospital has been gradually improved. The clinical pharmacists and surgeons will check the room, comprehensively understand the ideas and methods of the clinicians for the diagnosis and treatment of patients and drug treatment, collect the adverse reaction information, connect with the clinical pharmacy construction of the advanced hospitals inside and outside the region, and take the lead in the information management. With the improvement of the management of antibacterial drugs by the Ministry of health and the use of CPMS in our hospital, the level of rationalization of drug use in our hospital has steadily increased, the structure of drug use tends to be reasonable, and the level of professionalization of prescription doctors has significantly improved.

References