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EVALUATION OF THE KNOWLEDGE ON COST OF ORTHOPEDIC IMPLANTS AMONG ORTHOPEDIC SURGEONS

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ABSTRACT

Objective: To determine the knowledge of Brazilian Orthopedic Surgeons on the costs of orthopedic surgical devices used in surgical implants. Methods: A questionnaire was applied to Brazilian Orthopedic Surgeons during the 46th Brazilian Congress on Orthopedics and Traumatology. Results: Two hundred and one Orthopedic Surgeons completely filled out the questionnaire. The difference between the average prices estimated by the surgeons and the average prices provided by the supplier companies was 47.1%. No differences were found between the orthopedic specialists and other subspecialties on the prices indicated for specific orthopedic implants. However, differences were found among orthopedic surgeons who received visits from representatives of implant companies and those who did not receive those visits on prices indicated for shaver and radiofrequency device. Correlation was found between length of orthopedic experience and prices indicated for shaver and interference screw, and higher the experience time the lower the price indicated by Surgeons for these materials. Conclusion: The knowledge of Brazilian Orthopedic Surgeons on the costs of orthopedic implants is precarious. Reduction of cost of orthopedics materials depends on a more effective communication and interaction between doctors, hospitals and supplier companies with solid orientation programs and awareness for physicians about their importance in this scenario. Level of Evidence III, Cross-Sectional Study.

Keywords: Prosthesis implantation. Cost control. Cost savings. Hospital costs. Orthopedics.

INTRODUCTION

Orthopaedics and Traumatology is the specialty of medicine responsible for the diagnosis and treatment of trauma to the skeletal muscles of the human body structures, as well as other disorders of the locomotor system. The word Orthopedics comes from the Greek, where “ortho” means straight, right and “pedics”, child. The enormous importance of the specialty comes from the pain-relieving capacity, restoration of function and correction of patients’ deformities through the various existing orthopedic treatments. In recent decades there have been significant advances in the area with the advent of increasingly less invasive techniques for patients. These changes are only possible due to the appearance, innovation and improvement of the surgical orthopedics materials sector. However, these new technologies may be the most responsible for the abrupt and constant increasing costs in healthcare. For these expenses to be controlled and better managed it is important that administrators, nurses, health insurance plans and particularly physicians have complete science of the amounts involved in health procedures.2 Previous studies, however, showed that orthopedic surgeons often do not have an exact idea of the values of orthopedics materials used in surgeries.3-5 Several studies have been conducted in recent years assessing the prospects and trends of Brazilian orthopedic surgeons. But all these studies had as main theme orthopedic conditions and did not address health management and costs.6-8 Therefore, the aim of this study is to determine the knowledge of Brazilian orthopedic surgeons on the cost of implants used in many orthopedic surgical procedures.

METHODS

This is a descriptive study using a questionnaire to a sample of orthopedic surgeons in Brazil. The questionnaire was prepared and approved by the authors so that it was very understanding and simple. It consisted of questions covering topics such as...
practice time, number of surgeries per year performed in the public and private sectors, subspecialty of the surgeons and estimate price of many orthopedics materials. (Annex 1)

The questionnaire was applied to Brazilian orthopedic surgeons during the three days of the 46th Brazilian Congress of Orthopedics and Traumatology. To resolve any questions while filling it, one of the authors of this paper was always present throughout the application period of the questionnaires. The prices of several orthopedics materials were requested for three different companies and an average price was obtained.

From the data from the questionnaires, a demographic descriptive statistics of the variables involved to characterize the sample was conducted. In order to perform a correlation between the orthopedics subspecialty within orthopedics and the prices indicated for orthopedics materials and a correlation between receiving visits from representatives of suppliers companies and the price of the materials, we used the Mann-Whitney test.

In the correlation analysis between prices of materials (R$) and experience time of orthopedists we used the Spearman correlation coefficient. Data were analyzed using SPSS for Windows version 16.0 and a significance level of 5% was adopted. The study was approved by the Research Ethics Committee of Universidade Federal de São Paulo, São Paulo, SP, Brazil, under number 1.283.422.

RESULTS
In total, 201 orthopedic surgeons completely filled out the questionnaire and were part of the sample analyzed. Table 1 shows the geographic distribution of surgeons according to the region of origin. Regarding the surgeons’ time of experience, we obtained an average of 7.4 ± 8.8 years (range 1-40 years). The results on the number of surgeries performed per year in the public and private sectors are shown in Table 2.

The more frequent Orthopedics subspecialties among the orthopedic surgeons were: Traumatology (19.9%); Knee (19.4%); Hip (8.5%) and Shoulder and Elbow (7.0%). When asked whether they were visited by representatives of orthopedic implant companies, 51.5% reported receiving visits from representatives of those companies.

The prices indicated by orthopedic surgeons for various orthopedics materials and the suppliers of orthopedic implants are shown in Tables 3 and 4.

The mean difference between the average prices expected by the surgeons and the average prices provided by the companies was 47.1%. This was a positive difference, i.e., the average prices given by most physicians were higher than the average commercial prices for the following materials: shaver (71.8%), anchor (11.6%), radiofrequency (54.5%) and interference screw (25.1%). As for the other materials (total knee prosthesis, total hip prosthesis and locked intramedullary nail of the tibia), the difference was negative, respectively, 63.8%, 66.7% and 36.6%. No significant differences were found between orthopedic specialists and other subspecialties regarding prices indicated for specific orthopedics materials. (Table 5)
Table 4. Prices (R$) indicated by supplier companies of orthopedic materials.

| Materials                        | Price Range       |
|----------------------------------|-------------------|
| Total knee prosthesis            | mean 23390, min 18000, max 29820 |
| Total hip prosthesis             | mean 27717, min 25000, max 32000 |
| Shaver                           | mean 800, min 500, max 1200 |
| Interference Screw               | mean 1767, min 1000, max 2800 |
| Radiofrequency                   | mean 1933, min 1400, max 2400 |
| Locked Intramedullary Nail       | mean 14977, min 11400, max 19080 |
| Anchor                           | mean 2433, min 1500, max 3800 |

Significant differences were found between the orthopedists who receive visits from companies representatives and those who did not regarding prices indicated for shaver (p = 0.028) and radio frequency (p = 0.033). The orthopedic surgeons who received visits indicated lower prices for the same materials. (Table 6)

Significant correlation coefficients were found between the time of experience of orthopedic surgeons and prices indicated for the shaver (r = -0.30 p <0.001) and interference screw (r = -0.19 p = 0.007). The coefficients are negative, indicating that the higher experience time, the lower the price indicated for these materials. (Table 7)

DISCUSSION

The main result of this study is the low awareness of orthopedic surgeons on the prices of materials used in surgical procedures. This is a worrying result, as 60% of health-related costs are controlled by the doctors’ decisions, although they receive little information and training on actions and strategies to reduce these costs.9

Streit et al.4 in a study that applied questionnaires to orthopedic surgeons, showed that the error in the estimate of orthopedics materials prices was 69%, and most of these errors (67%) underestimated the prices of orthopedics materials. Another study on orthopedic implants costs showed that only 21% of doctors estimated correctly the values of the materials provided by companies.5 In this study the difference between the prices estimated by doctors and the actual price provided by companies was 47%; there was both underestimation and overestimation of prices by the surgeons in, respectively, 3 and 4 types of orthopedics materials.

Burns et al.2 showed a close and long term relationship between surgeons and implant manufacturers. However, only a small part of the orthopedic surgeons received financial payments from supplier companies.2,10 In Brazil, in our surgeons’ sample, more than half (51.5%) reported receiving visits from representatives of orthopedic implant companies. However, differences were only found between the orthopedists who received visits from representatives of companies and those who did not. Considering shaver and radiofrequency, the orthopedic surgeons visited by commercial representatives underestimated their prices.

Okike et al.5 showed that medical residents thought they had worse knowledge on the costs of orthopedic implants that more experienced doctors. This study found differences between the experience time of orthopedists and prices listed for some materials; the longer the surgeons’ experience time, the lower the price indicated for some materials. However, no differences
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Table 6. Prices of Materials (R$) according to the visit of commercial representatives.

| Materials                        | Receive visits from companies representatives |  |
|----------------------------------|-----------------------------------------------|---|
|                                  | Yes (n=103)                                   | No (n=97)                           |
| **Total knee prosthesis**        |                                               |                                       |
| mean (Standard deviation)        | 13087.38 (9145.19)                            | 15438.14 (14060.37)                 |
| median                          | 10000                                         | 10000                                 |
| minimum – maximum               | 1500.00 – 50000.00                            | 1500.00 – 100000.00                 |
| p-value (Mann-Whitney test)      | 0.58                                          |                                       |
| **Total hip prosthesis**         |                                               |                                       |
| mean (Standard deviation)        | 16249.51 (14435.62)                           | 16675.26 (13028.82)                 |
| median                          | 12000                                         | 15000                                 |
| minimum – maximum               | 1500.00 – 100000.00                           | 1000.00 – 80000.00                  |
| p-value (Mann-Whitney test)      | 0.625                                         |                                       |
| **Shaver**                       |                                               |                                       |
| mean (Standard deviation)        | 2383.50 (3171.26)                             | 3340.21 (6338.28)                   |
| median                          | 1500                                          | 2000                                  |
| minimum – maximum               | 200.00 – 20000.00                             | 200.00 – 60000.00                   |
| p-value (Mann-Whitney test)      | 0.028                                         |                                       |
| **Interference screw**           |                                               |                                       |
| mean (Standard deviation)        | 2430.58 (3682.71)                             | 2305.15 (2814.83)                   |
| median                          | 1500                                          | 1500                                  |
| minimum – maximum               | 200.00 – 30000.00                             | 50.00 – 20000.00                    |
| p-value (Mann-Whitney test)      | 0.891                                         |                                       |
| **Radiofrequency**               |                                               |                                       |
| mean (Standard deviation)        | 3207.77 (5629.46)                             | 5400.52 (11479.48)                  |
| median                          | 1800                                          | 2000                                  |
| minimum – maximum               | 100.00 – 40000.00                             | 300.00 – 100000.00                  |
| p-value (Mann-Whitney test)      | 0.033                                         |                                       |
| **Locked intramedullary nail**   |                                               |                                       |
| mean (Standard deviation)        | 4660.29 (3426.30)                             | 6473.71 (6560.79)                   |
| median                          | 4000                                          | 4000                                  |
| minimum – maximum               | 110.00 – 20000.00                             | 300.00 – 30000.00                   |
| p-value (Mann-Whitney test)      | 0.307                                         |                                       |
| **Anchor**                       |                                               |                                       |
| mean (Standard deviation)        | 2402.91 (2739.52)                             | 3148.25 (3710.63)                   |
| median                          | 1800                                          | 2000                                  |
| minimum – maximum               | 300.00 – 25000.00                             | 100.00 – 25000.00                   |
| p-value (Mann-Whitney test)      | 0.18                                          |                                       |

Table 7. Analysis of correlation between material's prices (R$) and time of experience of the orthopedists.

| Probable prices indicated by orthopedists (R$) | Spearman correlation coefficient (r) | p-value |
|------------------------------------------------|-------------------------------------|---------|
| Total knee prosthesis                          | 0.14                                | 0.051   |
| Total hip prosthesis                           | 0.09                                | 0.227   |
| Shaver                                         | -0.3                                | < 0.001 |
| Interference screw                             | -0.19                               | 0.007   |
| Radiofrequency                                 | -0.09                               | 0.189   |
| Locked intramedullary nail                     | -0.01                               | 0.874   |
| Anchor                                         | -0.03                               | 0.629   |

were found regarding the subspecialty referred by the orthopedic surgeons and the prices indicated for orthopedics materials specific for this particular subspecialty. Despite the increasing costs in health care, a study published by the American Society of Orthopaedic Surgeons showed that most surgeons did not consider themselves responsible for containing health costs. We do know, however, that physicians have a key role in this economic process and in reducing health costs. A previous study showed that 85% of patients proved willing to pay additional amounts for best quality materials indicated by doctors even whether they were not covered by health insurance plans. While cost containment is critical to the viability and maintenance of health systems, care should be taken to ensure that cost-effectiveness does not increase the number of complications and compromise the patient’s outcomes. Closer cooperation between the various health stakeholders such as hospitals, doctors, health plans and orthopedic implant companies is required to achieve the goal of significantly reducing implant costs, maintaining the quality of services provided to patients.

CONCLUSION

The knowledge of Brazilian orthopedic surgeons on the costs of orthopedic implants is feeble. Cost reduction of orthopedics materials depends on a more effective communication and interaction between doctors, hospitals and supplier companies with more solid orientation and awareness programs for physicians about their importance in this scenario.
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Annex 1. Questionnaire on costs of orthopedics materials.

| City/State: ____________________________________________________________ |
| --- |
| 1- Years of experience as an Orthopedist Surgeon: _______________________ years |
| 2- How many surgeries do you perform per year? |
| Surgeries per year | Public Service | Private/Service |
| < 10 | | |
| 10-20 | | |
| 20-30 | | |
| 30-40 | | |
| >40 | | |
| 3- What do you think is the average price of a total knee prosthesis? |
| Price: ______________________ reais |
| 4- What do you think is the average price of a total hip prosthesis? |
| Price: ______________________ reais |
| 5- What do you think is the average price of a shaver blade for knee arthroscopy? |
| Price: ______________________ reais |
| 6- What do you think is the average price of an amaterial interference screw for ACL fixation? |
| Price: ______________________ reais |
| 7- What do you think is the average price of a radiofrequency? |
| Price: ______________________ reais |
| 8- What do you think is the average price of an intramedullary nail for osteosynthesis of a tibia fracture? |
| Price: ______________________ reais |
| 9- What do you think is the average price of an absorbable anchor suture? |
| Price: ______________________ reais |
| 10- What is your subspecialty? |
| □ Spine | □ Shoulder/Elbow | □ Hand |
| □ Hip | □ Knee | □ Foot/Ankle |
| □ Trauma | □ Tumor | □ Pediatric Orthopedics |
| 12- Do you frequently receive visits from sales representatives of orthopedics material? |
| □ Yes | □ No |
| Price: ______________________ reais |