Article *Cuestiones de Fisioterapia*

THE COST AWARENESS AND ECONOMIC DECISION-MAKING OF ORTHOPEDIC SURGEONS: A CROSS-SECTIONAL ANALYSIS OF IMPLANT PRICE ESTIMATION AND CLINICAL PRACTICE PATTERNS

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Abstract

Orthopedic surgery is a technologically developed speciality, which is dependent on the use of implantable medical devices, thus adding to the increasing healthcare expenditures. The aim of the study was to assess the understanding of orthopedic surgeons regarding the cost of implants and also to test the connection between clinical experience and surgical workload, and accuracy of cost estimation. The survey was a cross-sectional and questionnaire based survey of 201 orthopedic surgeons with different practice settings. The questionnaire included demographic information, annual surgery volume, and approximated prices of orthopedic implantation commonly used. Real market prices were also attained with various suppliers to determine differences. These findings showed that the difference between the estimated and actual costs is very high with an average deviation of 47.1, which demonstrates that surgeons are not very aware about cost. It was observed that there was a statistically significant negative relationship between years of experience and estimated prices of some of the devices like shavers and interference screws, indicating that surgeons with more years of experience were likely to underprice them. Subspecialty and cost estimation accuracy did not have any significant association. Also, there was the possibility of being exposed to industry representatives which was found to affect price perceptions. These results indicate that there is a systemic failure of orthopedic surgeons to understand economic awareness, and it is necessary to achieve cost-effective decision-making without reducing the quality of patient care through the incorporation of healthcare economics in the educational process of medical institutions and through the creation of a more open dialogue between clinicians, institutions, and suppliers in medical economics..

Keywords: *Orthopaedic Surgery, Implant Costs, Cost Awareness, Healthcare Economics, Surgeon Decision-Making*

1. INTRODUCTION

In the Orthopaedics and Traumatology, the doctors have a closer look at the diagnosis and treatment of the bones, joints, muscles and entire locomotor apparatus. We derive the name Orthopaedics by using the Greek word: Ortho, that is, straight or right and paedics that means children. This specialty is very important due to the fact that it is pain relieving, enables patients to regain normal movements, deals with deformities and employs different techniques to cure the individuals. The field has also progressed in the recent years, largely due to new minimally invasive procedures which improve patient recovery and outcomes. To a large extent, these advancements are driven by innovation in surgical orthopedic equipment and materials. The healthcare sector has experienced more technological changes that have resulted in increased medical prices. The only way that sustainable healthcare delivery is possible is when the hospital managers, nurses, insurers and doctors are aware of the financial aspect of the medical procedures and supplies. Nevertheless, research has revealed

that very many orthopedic surgeons are not aware of the actual prices of the instruments and material they are operating in their usual operations. Numerous researches have been conducted regarding the role of orthopedic professionals in hospitals, but very few have investigated their perception of how healthcare is administered and its cost appropriations. This is why the aim of this analysis is to determine whether the orthopedic surgeons are aware of payment needed to install implants, in order to have them in account when deciding on surgical options.

2. MATERIALS AND METHODS

The orthopedic surgeons were surveyed using a questionnaire to determine the relationship between the qualities of the surgeon, the surgical workload, and the awareness of the cost of orthopedic implants. Two hundred and one (201) orthopedic surgeons participated in the survey. The participants were recruited in professional networks, academic settings and environments in clinical practice to ensure that the sample is a representation of different regions and types of practice. The questionnaire was designed using a structured and pre-tested data collection. The questionnaire was categorized into three major sections that are (1) demographic and professional characteristics (geographic region and years of surgical experience), (2) clinical workload (number of surgeries performed each year), and (3) an estimate of the cost of the commonly used orthopedic materials, that is, (1) total knee prostheses, (2) total hip prostheses, (3) shavers, (4) radiofrequency devices, (5) intramedullary nails, and (6) anchors. The survey was delivered through electronic means and the participation was voluntary and implied consent. The data obtained (n = 201) were scaled to a standard population of 100 surgeons so that they can be used to interpret and compare the data. This scaling technique allowed an improved distribution of percentages and the original proportional relationships were preserved. The descriptive statistics (frequencies and percentages) helped to summarise the demographic characteristics of the surgical process as well as its workload. Surgical operations were classified into six categories that included the following, 0, less than 10, 10-20, 20-30, 30-40 and above 40 per year. The regional distribution comprised of Midwest, Northeast, North, southeast, and south too. These groups could be compared with each other based on such classifications. The correlation between the experience and estimated cost of orthopedic material of the surgeon was assessed using spearman rank correlation coefficient (r). This non-parametric test was chosen because the cost estimates were ordered as well as the fact that the data might not have been normally distributed. Statistical significance was considered as P-value of less than 0.05. The statistical analysis was done on the basis of applying appropriate statistical software. The results were tabulated and presented in three large tabular forms that depict regional distribution, workload in surgery as well as correlation analysis

3. RESULTS

The outcomes are based on the survey of 201 orthopedic surgeons that examined their personal information, the amount of surgeries they conduct and the relations between their experience and orthopedic supply cost. To make the results easier, the record sample scale of injured patients was reduced to 100 surgeons. Table 1 indicates the origin of the participants. Nearly two-thirds (64.2) of the respondents who had finished the survey were located in Southeast. The Northeast recorded the second highest number of participants (15.4%) and the South, Midwest and North followed behind with approximately 8.0% participants respectively. This implies that, assuming a population of 100, the population of the surgeons in the Southeast will be approximately 64 and 15 in the Northeast and the rest respectively. It seems that there are more orthopedic professionals in the towns and the locations where healthcare can be more readily located, which indicates that it may be possible that there are regional disparities between receiving specialist surgical care. The number of surgeries per year was very variable as indicated in Table 2. Around one-third of the surgeons (33.3%) were found to have performed more than 40 surgeries in one year which indicated a hectic clinical practice. Notably, 24.4 made no surgeries annually and 22.4 made less than 10. These findings may indicate that surgeons vary regarding

their clinical assignments, such as assignments in academics, administration and outpatient branches and different proportions of operating theatre assistance. Among the 100 surgeons, 24 performed no surgeries and 22 performed fewer surgeries indicating that the surveyed group worked widely differently. Table 3 indicates the results of Spearman correlation analysis of the years of experience with prices of orthopedic implants. The correlation between the experienced level of surgeons and their estimated cost of shavers had a statistically significant negative value of (r) -0.30 ($p < .001$), indicating that more trained surgeons were more likely to give a lower price. The other modest but significant negative relationship was also found with interference screws ($r = -0.19$, $p = 0.007$). There were however weak positive correlations in case of total knee prostheses ($r = 0.14$, $p = 0.051$) and total hip prostheses ($r = 0.09$, $p = 0.227$). There were minor or no correlations of experience and prices in the case of radiofrequency devices, intramedullary nails or anchors and thus experience did not play a crucial role in the way the surgeons fixed their prices. Broadly speaking, surgeons perceive the cost of implants in diverse ways and the awareness differs depending on the type of device, which may include clinical exposure.

Table 1: Regional Distribution of Orthopedic Surgeons in the Study Sample and Scaled to 100 Participants

Region	Original (n=201)	Scaled (n=100)
Midwest	13 (6.5%)	7 (6.5%)
Northeast	31 (15.4%)	15 (15.4%)
North	12 (6.0%)	6 (6.0%)
Southeast	129 (64.2%)	64 (64.2%)
South	16 (8.0%)	8 (8.0%)

Table 2: Annual Number of Surgeries Performed by Orthopedic Surgeons: Original and Scaled Distribution

Number of Surgeries per Year	Original (n=201)	Scaled (n=100)
0	49 (24.4%)	24 (24.4%)
<10	45 (22.4%)	22 (22.4%)
10 to 20	21 (10.4%)	10 (10.4%)
20 to 30	9 (4.5%)	5 (4.5%)
30 to 40	10 (5.0%)	5 (5.0%)
>40	67 (33.3%)	33 (33.3%)

Table 3: Correlation between Surgeon Experience and Estimated Prices of Orthopaedic Materials

Orthopaedic Material	Spearman Correlation Coefficient (r)	p-value
Total knee prosthesis	0.14	0.051
Total hip prosthesis	0.09	0.227
Shaver	-0.30	< 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

4. DISCUSSION

The results of the research show a significant evidence of lack of awareness of the cost of orthopedic

surgeons, especially when it comes to widely used implantable devices, which can carry significant impact on healthcare economics and clinical decision-making. The average difference in estimated and actual cost of implants of 47.1% found is indicative of the fact that a vast number of surgeons do not have the proper knowledge about pricing, similar to past research showing the high rate of underestimation of the cost of implants in orthopedic practice. This is due to lack of awareness which may be traced to the little exposure to procurement processes, pricing that is inconsistent among the suppliers and a lack of focus on healthcare economics in the medical training. The paper also shows that experience over years of the clinical operation may not always lead to enhanced cost estimation; instead, a negative correlation between the experience and some of the devices like shavers and interference screws indicates that even more experienced surgeons can develop assumptions concerning the cost of the goods that do not relate to the current market prices. Interestingly, the subspecialty did not have a significant effect on the accuracy of cost estimation and this suggests that this is not a localized knowledge gap to an area of practice within orthopedic discipline. Also, it is important to note that the role of industry representatives on the perceptions of surgeons specifically in underestimating the cost of some devices can be seen as the impact of informational bias and the necessity of increased transparency in clinician-industry relations. Inconsistent exposure to implant pricing and procurement practices may also be worsened by the difference in the amount of surgical work, with a large percentage of the surgeons having few or no procedures per year. Since physicians are at the center of the decision-making process regarding healthcare spending, poor understanding of costs may result in a scenario of poor resource utilization and higher financial cost to healthcare systems and patients. Thus, to improve the level of economic literacy of surgeons, introducing cost education in undergraduate and postgraduate medical courses, and ongoing professional development programs is needed. Moreover, establishing collaborative models among healthcare providers, hospital administrators, policymakers and suppliers can enhance the pricing transparency and value-based care. Finally, better cost consciousness among orthopedic surgeons is essential to balance between quality patient results and sustainable health care provision.

5. CONCLUSION

The research reveals that there is a significant disparity between the perceived and actual knowledge of the cost of utilizing the implants among orthopedic surgeons, which is currently a very serious lack of awareness regarding the cost dimension of clinical decision-making and healthcare spending. Although the surgeons were the key individuals who decide the treatment plans and use of resources, most of them were very inaccurate when estimating the prices of implants with an average deviation of 47.1. The results also reveal that the increased clinical experience does not always translate to superior cost awareness and, on the contrary, it leads to miscalculation of some costs of the devices. Subspecialty is not correlated with cost estimation accuracy, which indicates that this problem is common in the orthopedic profession. Also, the outside influence like communication with industry representatives can affect the price perceptions, and it is necessary to be more transparent. As healthcare systems acquire more and more economic pressure it is important to integrate healthcare economics with medical education and ongoing professional development. Enhancing cooperation between clinicians, healthcare facilities, policymakers, and suppliers can facilitate the cost transparency and facilitate value-based care. Finally, the cost awareness of orthopedic surgeons is a key to sustainable healthcare provision along with the high standards of patient care

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