Journal of Education, Environment, and Health | ISSN 1983-0173

Representações dos Profissionais da Saúde na Cirurgia Robótica

Representations of Health Professionals in Robotic Surgery

Representaciones de los Profesionales de la Salud en la Cirugía Robótica

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RESUMO

Objetivos: identificar representações dos profissionais da saúde que atuam na cirurgia robótica (CR); realizar a análise lexicométrica a partir das respostas dos participantes da pesquisa, à luz da lei de *Zipf*; caracterizar no discurso dos profissionais de saúde elementos que influenciam no procedimento robótico. **Método:** pesquisa descritiva-exploratória, quanti-qualitativa, realizada com 66 profissionais que atuam na cirurgia robótica. Aplicou-se a análise de conteúdo de Bardin, com auxílio do software Iramuteq@. **Resultados:** Os profissionais da saúde definem a CR como um procedimento altamente tecnológico, capaz de aumentar a segurança e a qualidade de vida do paciente, porém apresenta o alto custo como fator limitador. **Conclusão:** o estudo revelou que os profissionais representam a CR como uma técnica inovadora, em ascensão, mais precisa, menos invasiva. Destacam ótimos desfechos clínicos, relacionados a uma melhor recuperação e, consequentemente, a uma melhor qualidade do paciente, porém devido ao custo elevado ainda distante da maioria dos brasileiros.

Descritores: Cirurgia aprimorada por robôs; Cirurgia robótica; Cirurgia assistida por robôs; Procedimentos cirúrgicos robóticos, Profissional da saúde; Telecirurgia.

ABSTRACT

Objectives: to identify representations of healthcare professionals working in robotic surgery (RS); to perform a lexicometric analysis based on the responses of research participants, in light of Zipf's law; to characterize in the discourse of healthcare professionals elements that influence the robotic procedure. **Method:** descriptive-exploratory, quanti-qualitative research, conducted with 66 professionals working in robotic surgery. Bardin's content analysis was applied, with the help of Iramuteq@ software. **Results:** healthcare professionals define RS as a highly technological

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procedure, capable of increasing patient safety and quality of life, however, it presents high cost as a limiting factor. **Conclusion:** the study revealed that professionals represent RS as an innovative, rising technique, more precise, less invasive. They highlight excellent clinical outcomes, related to better recovery and, consequently, to a better quality of life for the patient, however, due to the high cost, it is still far from the majority of Brazilians.

Descriptors: Robot-enhanced surgery; Robotic surgery; Robot assisted surgery; Robotic surgical procedures, Health professional; Tele surgery.

RESUMEN

Objetivos: identificar representaciones de los profesionales de la salud que trabajan en cirugía robótica (CR); realizar un análisis lexicométrico basado en las respuestas de los participantes de la investigación, a la luz de la ley de Zipf; caracterizar en el discurso de los profesionales de la salud elementos que influyen en el procedimiento robótico. **Método:** investigación descriptiva-exploratoria, cuanti-cualitativa, realizada con 66 profesionales que trabajan en cirugía robótica. Se aplicó el análisis de contenido de Bardin, con la ayuda del software Iramuteq@. **Resultados:** los profesionales de la salud definen la CR como un procedimiento altamente tecnológico, capaz de aumentar la seguridad y la calidad de vida del paciente, sin embargo, presenta el alto costo como un factor limitante. **Conclusión:** el estudio reveló que los profesionales representan la CR como una técnica innovadora, en ascenso, más precisa, menos invasiva. Destacan excelentes resultados clínicos, relacionados con una mejor recuperación y, consecuentemente, con una mejor calidad de vida para el paciente, sin embargo, debido al alto costo, aún está lejos de la mayoría de los brasileños.

Descriptores: Cirugía mejorada por robot; Cirugía robótica; Cirugía asistida por robot; Procedimientos quirúrgicos robóticos, Profesional de la salud; Telecirugía.

INTRODUCTION

In contemporary society, indiscriminately, everyone is affected by technology, directly or indirectly. It influences people's way of life as well as requiring new skills and versatile individuals, contextualized not only technologically, but with rapid mobilization of knowledge.

In this way, Robotics stands out, which is the science of systems that interact with the real world with little or no human intervention, having as one of its main characteristics multidisciplinarity, as it integrates disciplines such as Mathematics, Mechanical Engineering, Electrical Engineering , Artificial Intelligence, among others.[1]

In this scenario, Robotic Surgery (CR) emerges, currently considered the evolution of minimally invasive laparoscopic surgery, in which the surgeon establishes, through small incisions and laparoscopic accesses, the introduction of the camera and working instruments inside the patient's

body, relying on the precise movements of the robot's arms.[2] It is a recent technology that has been growing rapidly and proving effective in optimizing health treatments, including cancer. Currently, every 36 seconds a surgeon begins a da Vinci procedure. There are more than five million procedures performed worldwide using intuitive technology.[3]

Da Vinci is a system marketed and patented by Intuitive, represented in Brazil by the company H. Stattner.[4] It consists of a set of equipment that integrates the robotic system, considered a sophisticated robotic platform, designed to allow minimally invasive performance of complex surgeries. Surgeries minimally invasive. Composed of three main components essential to its operation, such as: the surgeon's console, from where all the robot's commands and movements issued by the surgeon come from; the patient cart, the robot itself, with its four robotic arms, where the robotic clamps are inserted and the optics are positioned; and the vision cart, where all the fiber optic cables of the system's equipment are connected.[5-7]

The system is intended to assist in the precise control of endoscopic instruments for the following surgical laparoscopic procedures: urological, general surgery, gynecological, general thoracoscopic and thoracoscopy-assisted cardiotomy procedures. It can also be used in adjunctive mediastinotomy to perform coronary anastomosis during cardiac revascularization procedures. The system is indicated for adult and pediatric use.[5]

CR, therefore, emerged as yet another innovative technology for customer assistance, a gain in the evolution of the surgical world, helping to minimize complications and infections and increase the quality of comprehensive assistance provided to the customer, with the performance of procedures as complexes.[8-10] Due to presenting several important features to promote greater customer security, it is noteworthy that the role of health professionals in dealing with this technology requires training, dexterity, and technical-scientific knowledge.[5]

It is also noteworthy that CR has been evolving rapidly and proving effective in optimizing health treatments, including cancer. Between August 2018 and February 2020, there was an increase of more than 90% in the number of surgical robotics equipment installed in Brazil; a jump from 40 to 77 robots.10 The state of São Paulo leads the market with 35 robotic platforms, followed by Rio de Janeiro with 14 platforms. In other words, Brazil follows the global trend of increasing the use of robotics in operating rooms, which can be seen in data such as those collected by the CR Program of the largest network of private hospitals in the country, which

records that from January 2020 until April of the same year saw an 11.8% increase in the use of robotic technology in general surgeries.[10]

In this way, since it is a technology that is still on the rise in Brazil, it is very likely that the production of knowledge on the topic is still in the solidification phase in the academic world. Therefore, the study established the following guiding question as the central problem of this investigation: What are the representations of health professionals regarding robotic surgery?

The objectives of the research were: to identify the representations of health professionals who work in robotic surgery (CR); carry out lexicometric analysis based on the responses of research participants, in light of Zipf's law; characterize in the speech of health professionals elements that influence the robotic procedure.

METHOD

Type or design of the study

This is descriptive-exploratory research, with a quantitative-qualitative approach.

Location or scenario in which data collection took place

Due to the current global context involving the COVID-19 pandemic, in which social isolation was used as a public health strategy to minimize the spread of the virus, the research was carried out in the virtual Brazilian scenario. It should be noted that the study began in the city of Rio de Janeiro – RJ, Brazil.

Period

Data collection was carried out between October 2020 and January 2021.

Population

The study population consisted of the universe of health professionals who perform their duties in the surgical center, specifically in CR, linked to different hospitals located in the most diverse states of Brazil/BR.

The sample was no probabilistic, with free dissemination over the Internet, through applications and social networks, with the snowball sampling strategy being encouraged, in which the study's initial participants were nurses who work in the practice of CR, called initial informants, the “seeds” of the chain of references. These nurses were asked to indicate other health professionals who fit the research profile, generating other participants, 'children' or even 'fruits' generated by 'seeds'. Therefore, 66 health professionals working in CR were part of the study sample.

The strategy used to approach research participants was carried out through messages sent via email, telephone messages via application (WhatsApp), and/or social networks (Instagram or LinkedIn), taking into account the recommendations of regulatory bodies. caused by the new coronavirus pandemic (COVID-19).

Selection Criteria

They were listed as inclusion criteria: professionals who provide direct assistance to clients undergoing CR in the pre, trans, and postoperative periods, and who agreed with the informed consent form (TCLE) when opening the form. Professionals who are academics and residents in the process of professional training were absent due to vacation or medical leave during the data collection period.

Study variables

The variables included in the study were carried out through a questionnaire, containing closed questions, with sociodemographic characteristics (sex, age group, level of education), work characteristics (time of training, role in the surgical procedure, time working in the surgical center, time working in CR, level of satisfaction with CR) and through open questions related to the theme, which demonstrated critical thinking and information from specialist professionals in the area: 1-State of Brazil in which you work with CR; 2-What does work in the surgical center represent; 3-What CR represents for you; 4-How do you consider CR in the context of health care on the global stage; 5-How do you consider CR in the context of health care in the Brazilian scenario; 6-Your training to work in CR was in the national or international territory, where specifically.7-Do you consider your training to work at CR satisfactory, if not, please justify; 8-You value technological evolution in your assistance; 9- In your opinion, what would be the main positive and negative aspects for patients undergoing RC; 10- Is there a difference between assisting patients undergoing CR and conventional surgery, if the answer is yes, what are the main differences; 11-Is there a difference between assisting patients undergoing CR and laparoscopic surgery, if the answer is yes, what are the main differences; 12-In your opinion, the use of a robot in the surgical procedure influences the assistance provided to the patient, in what way; 14-When you think about CR, what word comes to mind?

Instruments used to collect information

Data collection was carried out using an online questionnaire formulated by the researchers and formatted in Google Forms. This was the case The instrument consisted of a semi-

structured script, with questions of a more objective nature, aimed at characterizing and working profile of the participants The second part of the questionnaire consisted of 13 discursive questions, with questions related to robotic surgery.

Data collect

At the time of data collection, participants were instructed on the online questionnaire, created using Google Forms, and its questions. The TCLE and the questionnaire were administered remotely, sent simultaneously via the same link, via email, telephone message, and message on the social network on the participant's profile, after the participant had been guided about the study and all its stages of development. Data collection, as well as your optional participation, guarantee of privacy, anonymity, and right to withdraw at any time, without any harm to yourself. The TCLE signature appeared on the home page of the questionnaire link, and it was mandatory to agree or disagree with participating in the research to continue answering the questionnaire. If the answer was negative, the person would be unable to respond to the questionnaire, and a positive answer would be a conditioning factor for opening the form.

Data Processing and Analysis

The quantitative data were exported to Google Sheets, tabulated, and organized for analysis in the Statistical Package for the Social Sciences (SPSS) version 23.0, applying descriptive statistics, with mean, median, and standard deviation. Qualitative responses, managed in the Iramuteq 0.7 alpha 2 software, were categorized and analyzed using the Bardin-formulated content analysis technique, which is a technique that, through reading and understanding the content of the interviews, allows analyzes that lead to objective descriptions, systematic and qualitative communications, promoting understanding of the meaning and meaning attributed to the focus of the problem.[11-12]

The questionnaires were transcribed and applied to the notepad, saved in a file with an extension coded UTF8, as described by Iramuteq, and applied to the software. The responses were transcribed in full, which generated a textual corpus configured according to the tutorial described for using the Iramuteq software.

In analyzing the data in this study, classification using the Reinert method was used, which establishes descending hierarchical classification in three modalities: simple classification on the text, simple classification on the ST text segment and double classification on the RST. From this,

the software organized the data analysis into a dendrogram that illustrated the relationships between the classes.[13]

Ethical aspects

The study was guided by the guidelines and regulatory norms for ethical observances for the development of research involving human beings in the Brazilian scenario, set out in Resolution No. 466/2012 of the National Health Council (CNS). The research protocol was approved by the Ethics Committee in Research (CEP) of the proposed institution and the institution where the study was carried out, with no opinion. 3,303,655. The researchers also followed the recommendations of the National Research Ethics Commission for conducting research online (CONEP, 2021).

It should be noted that participants received all information pertinent to the research and the guarantee of privacy, anonymity, and the right to withdraw at any time, without prejudice to themselves at any stage of the study, as described in the ICF.

RESULTS

66 healthcare professionals who work at CR participated in the research. Of these, 36 (54.55%) were women and 30 (45.45%) were men. Regarding age, the average age group with the highest number of participants was between 36 and 40 years old, with 20 (30.3%) participants, followed by the age group between 41 and 45 years old, with (24.2%). No participant was under 26 years of age or over 65 years of age (Table 1).

Table 1 -Table of variables used in the corpus

VARIABLES 1									
SEX		AGE GROUP							
1	2	1	2	3	4	5	6	7	8
M	F	26_30	31_35	36_40	41_45	46_50	51_55	56_60	61_65
44.6%	55.4%	3.03%	12.1%	30.3%	24.2%	19.7%	3.03%	3.03%	4.54%

Source: Survey data, 2021.

Regarding the professional category, 17 (27.7%) participants were nurses, 16 (%) surgical scrub nurses, 11 (%) main surgeons, six (%) were circulating and scrub nurses, four (%) anesthesiologists, three (%) proctors, three (%) assistant surgeons, two (%) as main surgeon and assistant surgeon, two (%) as main surgeon and proctor, and one (%) as nurse and surgical scrub nurse and one (%) response blank. (Table 2).

Table 2 -Table of variables used in the corpus

VARIABLES 2						
CATEGORY PROFESSIONAL						
1	two	3	4	5	6	7
Surgeon Main	Proctor	Surgeon Assistant	Anesthesiologist	Nurse	Current	Instrumentator
23.1%	7.7%	7.7%	6.2%	27.7%	9.2%	35.4%

Source: Source: survey data, 2021

In relation to the time of professional training, the majority of participants, 16 (34.8%) professionals, had trained between 11 and 15 years. Regarding the time working in the CC, most professionals, 23 (34.8%) also have between 11 and 15 years of experience. There was a predominance of professionals with training and experience in CR less than six years, corresponding to 47 (71.2%) professionals. Characterizing CR as a new and evolving technology with an upward curve in the training of new professionals. (Table 3).

Table 3 -Table of variables used in the corpus

VARIABLES 3									
TRAINING TIME (YEARS)							TIME OF ACTION IN ROBOTIC SURGERY		
1	2	3	4	5	6	7	1	2	3
1-5	6-10	11-15	16-20	21-25	26-30	> 30	01-05	6-10	11-15
4.54%	15.2%	34.8%	16.7%	13.6%	9.1%	6.06%	71.2%	24.2%	4.6%

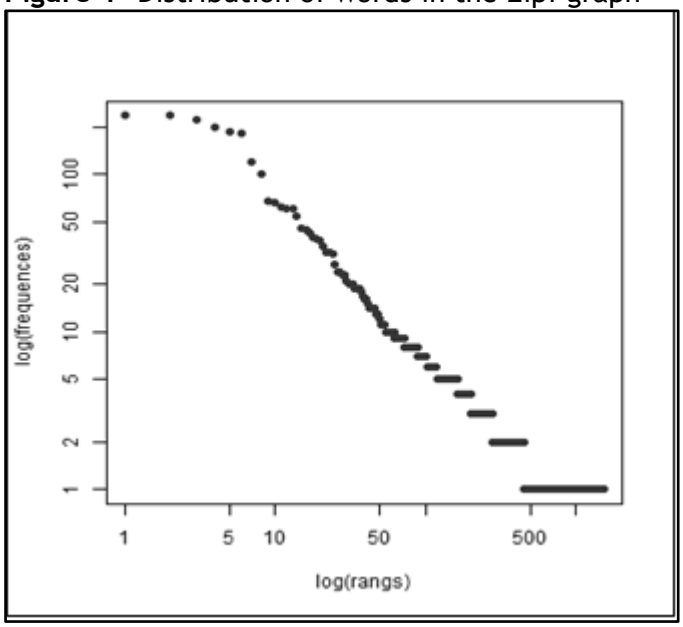
Source: survey data, 2021

After exploring the textual corpus and using the word Technology as a central theme, associated terms were obtained, as proposed by Bardin.[12] This term may be associated with the specific discourse on the use of CR among professionals who work in the operating room, being systematically grouped according to the categories that emerged after Iramuteq® analysis.

This textual corpus 1 was prepared based on the answers to the questions contained in the online questionnaire. The analysis sliced 40 elements of context units (UCE), dividing them into 170 text segments, from 66 texts/respondents, with 5273 occurrences/words, distributed in 1785 forms, of which 1292 occurred only once (hapax), which represents 24, 5% (n=x) of the total occurrences/words.

In Zipf's analysis, the 66 texts were sliced into 1540 different shapes, resulting in 1086 hapaxes, of which 20.60% (n=x) were occurrences/words and 70.52% (n=x) were shapes. The average number of occurrences per text was 79.89 words. Figure 1 shows the distribution of occurrences according to Zipf's law.

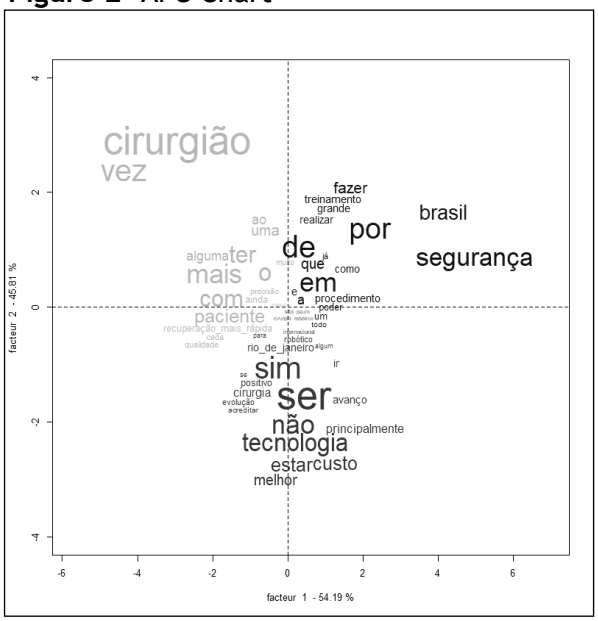
Figure 1 -Distribution of words in the Zipf graph



Source: survey data, 2021

The correlation factor analysis - AFC (Figure 2) shows the level of correlation between the words 'patient', 'faster recovery', 'precision' and 'procedure', considering their approximation to the '0' axis of the graph.

Figure 2 -AFC Chart



Source: survey data, 2021

The Descending Hierarchical Classification - CHD divided the corpus into six Classes. Initially, he divided the corpus into three subcorpus groups, Class 3, 4 and 5, 2 and 1 separated from Class 6, generating the result represented in the dendrogram in Figure 3.

Figure 3 -Dendrogram of the descending hierarchical classification of textual corpus 1

Source: survey data, 2021.

From the analysis and extraction of terms associated with the central theme Technology, carried out through the analysis carried out by Iramuteq®, it was possible to admit that health professionals represent CR as a highly technological procedure, capable of increasing the safety and quality of the patient's life; however, far from the reality of many patients, due to its still very high cost, which limits the access of the majority of Brazilians dependent on surgery to correct a health problem.

Observing the dendrogram presented in Figure 1, it can be seen that class 1 (17.02%) is directly related to the high cost of the procedure, still considered a limiting factor, which makes CR a procedure that is not very accessible, as can be seen. Evidenced in the responses of health professionals who participated in this research, as highlighted in the statements below.

Responsibility essential technology in some procedures for adequate patient recovery, still little publicized for the surgical part, yes, positive, patient recovery, negative, cost.(**** *n_3 *s_2 *i_4 *f_5 *t_3 *e_2 *er_1 *g_4 *ns_1)

Being able to improve people's quality of life is a technological milestone in health that is very far from the reality of many people who are still unfortunately growing, but also very far from the reality of the majority. (**** *n_54 *s_2 *i_2 *f_7 *t_2 *e_2 *er_1 *g_3 *ns_1**).**
Because it has a high cost, especially for the patient, this technology is still more elite, I don't think we need to train more, take classes with the company with reference institutions. (**** *n_33 *s_2 *i_3 *f_5 *t_2 *e_3 *er_1 *g_4 *ns_2).

Continuing the analysis of the results, Class 2, with 14.89% of the ST analyzed, presents elements that reveal the satisfaction of healthcare professionals working in CR. Most of the research participants lived in the city of Rio de Janeiro and international training is noticeable, especially among surgeons, as the technology is more widely distributed in the USA. It highlights, once again, the negative reference regarding the cost of the procedure. This class presented the following relevant words: international (chi² 48.47), evolution (chi² 37.38), satisfaction (chi² 35.27), Rio de Janeiro (chi² 17.6) and negative cost (chi² 17.52) , as can be seen in the following statements:

Rio de Janeiro In the last year, in Brazil, the number of robotic platforms has increased significantly, but is still not accessible to the entire international and national population. Positive data are shorter recovery time and less bleeding; The negatives are inexperienced doctor, surgical time, very high risk of injury and cost. (**** *n_17 *s_2 *i_4 *f_5 *t_2 *e_4 *er_1 *g_4 *ns_1 –)
- Paraná. Satisfaction, precision, and excellence. There is no return, but the very high cost needs to be improved. Negative: cost. Positive: everything else, better recovery, and higher precision technology. (**** *n_56 *s_1 *i_5 *f_2 *t_3 *e_3 *er_1 *g_2 *ns_1)
São Paulo. Moral and financial gratification and reward. Evolution: an evolution with no return, still distant from a large part of society. International: Bogotá. Positive: security. Negative: cost ergonomics safety image range of motion postoperative pain.(**** *n_43 *s_1 *i_4 *f_1 *t_3 *e_4 *er_1 *g_4 *ns_1)

In turn, Class 3 with 15.6% of the ST analyzed expresses the benefits of CR, highlighting the shorter hospitalization time and the patient's recovery time. The elements of this class that stood out were: surgeon (chi² 42.48), shorter hospital stay (chi² 19.04), material (chi² 17.43), due (chi² 17.43), faster recovery (chi² 13 .97). It is worth noting that the word fastest recovery (value P = 0.0018) does not present a P value with statistical significance within the value of 0.0001.

However, it is a word that is directly related to shorter hospital stays. References to Class 3 statements can be found in the following.

*R*obot transforms and allows a surgeon to perform a procedure with a high level of quality and precision. (**** *n_14 *s_1 *i_4 *f_7 *t_2 *e_2 *er_2 *g_5 *ns_1)

The minimally *invasive process, which contributes to the patient's recovery, reduces the risk of infection and access to certain surgical points that the surgeon would not have access to, not only in relation to the material to be used, which are specific materials for each approach.*(**** *n_16 *s_2 *i_5 *f_6 *t_4 *e_4 *er_1 *g_5 *ns_3)

Less surgical anesthetic trauma and its consequences, shorter hospital stay and consequently lower cost, faster recovery and earlier discharge negative learning curve for some surgeons longer selection of patients who are not very well done, sometimes making their anesthetic management difficult that we do not have the excellent results expected with CR.(**** *n_44 *s_2 *i_9 *f_4 *t_7 *e_7 *er_2 *g_4 *ns_1)

Class 4 represents 21.99% of ST. In it, respondents point out some differences between surgical modalities, making a comparison between assisting patients undergoing conventional and laparoscopic surgeries, with robotics. Professionals report the superior quality obtained with CR, such as better vision of the operative field, greater surgical precision, surgeon ergonomics, greater care in positioning and patient safety, lower infection rates, lower probability of blood transfusions and shorter time of hospitalization. The most significant words in this class were surgery (chi231.32), more (chi222.28), case (chi222.24), doctor (chi218.39) and CR (chi217, 27), all with P-value = 0 ,0001. Some testimonials from class 4 can be seen below:

A trained and qualified multidisciplinary team, the assistance must be the same in the sense of excellence in service and care, what differentiates is the particularities of this surgery that must be checked so as not to compromise the surgical procedure, but these checks should be part of safe technology in the surgery. (**** *n_11 *s_2 *i_3 *f_6 *t_3 *e_3 *er_1 *g_4 *ns_2)

Less surgical trauma for conventional surgery patients, longer hospital stays, the possibility of more complex surgery, yes, special care is required to position the patient, more possibilities to minimize surgical trauma.(**** *n_53 *s_2 *i_6 *f_7 *t_3 *e_3 *er_1 *g_5 *ns_1)

Lower risk of contamination, faster recovery time, among other negatives, surgical time in some cases, yes, we have a broad view of CR through smart screens. (**** *n_64 *s_2 *i_8 *f_7 *t_3 *e_3 *er_1 *g_6 *ns_2)

Class 5, represented by 15.6% of TS, has a strong relationship with what the study respondents say about the training received, mainly by nurses and anesthesiologists to work in CR, and the quality of the surgical procedure. Its main elements were: institution (chi222.27) and surgical procedure (chi216.32), both with a value of P = 000.1, closely correlated with Classes 3 and 4. A large part of the studied population, consisting of nurses, scrub nurses, and anesthesiologists, report having received training at their own institution. Professionals once again highlight the quality of the surgical procedure, which is more precise, minimally invasive, and provides excellent clinical outcomes.

In Brazil, this is an important advance that grows every day on the national territory. In the institution where I work, I do not think it should have been bigger and more intense, but positive, greater precision in the operation, less risk of damage.(**** *n_1 *s_1 *i_3 *f_5 *t_2 *e_3 *er_1 *g_4 *ns_1)

Yes, the vision of the surgical procedure through robotics is much better. I think there must be a surgeon-patient interaction.(**** *n_9 *s_2 *i_5 *f_6 *t_6 *e_4 *er_1 *g_4 *ns_2)

Yes, robotics improves the videolaparoscopy technique, obviously it has the advantage of 3D visualization, which effectively assists the surgeon's conduct in the surgical procedure, because the dynamics are fully differentiated so that the patient can obtain all the assistance valued in cohesive and precise orderly care.(**** *n_10 *s_2 *i_6 *f_6 *t_5 *e_5 *er_2 *g_4 *ns_1)

Finally, Class 6, once again, highlights technological advancement, advantages and best results with the use of CR, allowing patients to return to their daily activities early, improving their quality of life, and better postmortem results. -operation, lower infection rates, among other benefits with the correct indication of the technology. The words that stood out most in this class were: everything (chi217.52), pass (chi217.52), no (chi217.52), allow (chi217.34), and best results (chi217.34), all with P Value = 0.0001, as can be seen in the statements below:

It allows for a faster recovery with an early return to daily activities and economic production; in addition, it reduces the rates of urinary incontinence, sexual impotence, and postoperative complications in general, all of which contribute to improving the quality of life of fantastic patients. ((**** *n_65 *s_1 *i_4 *f_1 *t_3 *e_2 *er_2 *g_4 *ns_1)

I was responsible for the CR unit at the Intuitive distributor in Brazil, and in 2015 I became responsible for Latin America for implementing robotic programs for Intuitive, where I was able

to undergo various training and specific training that contributed greatly to sharing the experience in Brazil and America. Latin.(**** *n_41 *s_1 *i_4 *f_5 *t_3 *e_4 *er_3 *g_4 *ns_2)
Very specialized work that requires trained human resources and available inputs and technologies for better execution of surgeries, the advancement of surgical technology and better results for the patient when the surgery is well indicated, I believe in its popularization worldwide over the years.(**** *n_11 *s_2 *i_3 *f_6 *t_3 *e_3 *er_1 *g_4 *ns_2)

Discussion

It was evident through the research carried out that the growth of CR is factual and occurs in global dimensions. According to Barbash and Gleid observations,[8] "Robotic technology has been rapidly adopted over the last 4 years in the United States and Europe. The number of robotic-assisted procedures performed worldwide has nearly tripled since 2007, from 80,000 to 205,000.[1]

Specifically, regarding the use of the da Vinci system, the authors note that the dissemination of the technique is also increasing. In the USA between 2007 and 2009 there was a 75% increase in the number of this system in surgical centers, going from 800 pieces of equipment to 1400 in this period in the American territory. In other countries in the same period, the number of equipment installed from the same system increased from 200 to 400 Da Vinci System consoles.[8] Confirming this steep growth curve, in a cohort study with clinical data from the Michigan *Surgical Quality Collaborative*(MSQC)15, with 169,404 patients in 73 hospitals, found that the use of robotic surgery for all general surgery procedures increased from 1.8% to 15.1% in the period from 2012 to 2018, and a broad and significant increase was observed of the use of this technology in hospitals that started the robotic program, associated with a decrease in traditional minimally invasive laparoscopic surgery.[13-15]

In Brazil, following this trend and according to data from the CR program of the largest network of private hospitals in the country, the increase in general surgeries using the technique was 11.8% from January to April 2020, with a growth of more than 90% of Da Vinci systems installed in Brazil, between 2018 and 2020.[10]

The reasons highlighted by the theoretical references studied by the researchers were corroborated by the professionals researched. In several procedures, the use of robotic technology shows positive results, as it is a less invasive technique and has a shorter recovery time, which

also results in a shorter hospital stay. The findings are in agreement with the research, in transoral robotic surgery (TORS)[16], carried out in 2016 with 304 surgical cases, it was shown that patients undergoing TORS, for the treatment of oropharyngeal carcinoma, were less likely to have a late gastrostomy and/or require a tracheostomy during treatment. Reflecting the decrease in morbidity associated with TORS approaches, it allowed for an earlier return to oral intake, with less use of chemoradiation in patients treated with TORS.[16]

Another study[17] corroborates this idea, postulating that 'the current robotic era has already shown a huge impact on the surgical field and is part of the natural and logical evolution of minimally invasive surgery. Robotic-assisted surgery is spreading rapidly and has overcome the intrinsic limitations of laparoscopy. High definition, three-dimensional stereoscopic vision and magnification, stable and surgeon-guided camera, improved ergonomics, superior range of motion and scale are notable advantages. Recent data have linked the benefits of visceral, urological, and colorectal surgery.

Regarding ventral hernia repairs, encouraging results were described, allowing for even more complex abdominal wall reconstructions in a minimally invasive approach with the robotic platform. The gynecological field has also seen benefits from robotic-assisted surgery, which appears to facilitate the surgical approach in selected cases of cervical, endometrial, and ovarian cancer, as well as endometrial cancer.[17] Therefore, the evidence pointed out by the researchers about the advantages of CR, presented in the results of this research, is in line with the authors mentioned above.

Regarding the difficulties and limitations of using CR in various surgical procedures, the professionals surveyed agree that the high cost is the main factor inhibiting access to this technology for the majority of the Brazilian population, which means that CR has restrictions in its use, although its growth and positive results are evident. However, in terms of the causes of costs in CR, they go beyond those highlighted above; recent studies[18] indicate that the hospitalization period can also be an influential variable in the increase in the costs of conventional surgeries, since “The average length of stay was shorter for the robotic approach in all procedures examined.

It is possible that these differences in length of stay could also be a factor associated with higher payments for open surgery and could explain the differences in total payments, as hospital-related costs likely exceed those of the other categories that comprise total payments (for

example pharmaceuticals)."[18] Consistent with the findings that associate TORS with lower values when related to the total cost of treatment.[16]

Despite this limiting factor, CR is considered, due to its notable benefits, a cost-effective technique compared to the comprehensive treatment of comorbidity. "As a result, minimally invasive procedures have played a more integral role in oncology surgery. However, this change occurred in the context of research demonstrating higher associated surgical costs and mixed evidence of improved clinical outcomes.[18]

In this way, it is possible to affirm that the data collected by the research are in line with the theoretical postulates observed.

Conclusions

Health professionals value CR as a highly technological procedure, on the rise in Brazil, capable of increasing the safety and quality of the surgery. Participants point out that there are differences between assisting patients undergoing conventional and laparoscopic surgical modalities, with robotics, reporting superior quality obtained with CR, such as better vision of the operative field, greater surgical precision, surgeon ergonomics, greater care in positioning and patient safety, lower infection rates, lower probability of blood transfusions. They highlight excellent clinical outcomes, related to better recovery, shorter hospital stay, and consequently a better quality of life for the patient.

However, despite all these potentialities obtained with CR, the procedure is still far from the reality of many Brazilians, due to its high cost, the main disadvantage, still very restricted to private institutions from the perspective of the health professionals who participated in the study. Therefore, the possibility of expanding studies that can minimize the costs and cost-effectiveness of the technique compared to other conventional methods is highlighted. It is believed that with the breaking of the Intuitive company's patent and the commercialization of new robotic technologies in the country, these limitations will be overcome, and the technique will be even more viable and disseminated.

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