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Highlights

Knowledge, Attitude, and Perception

Prevalence of Musculoskeletal Injuries

Discovering Thoughts, Inventing Future

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CONTENTS OF THE ISSUE

- i. Copyright Notice
 - ii. Editorial Board Members
 - iii. Chief Author and Dean
 - iv. Contents of the Issue
-
- 1. Impact and Prevalence of Musculoskeletal Injuries due to Accident at Work in Brazil, 2015-2020. ***1-5***
 - 2. Intraosseous Synovial Cysts of the Scaphoid Bone: A Rare Case of Fracture and Surgical Management. ***7-10***
 - 3. Knowledge, Attitude, and Perception Regarding the Application of Bioethical Principles in Students of the School of Dentistry, National University of Caaguazú, Paraguay, Year 2022. ***11-16***
-
- v. Fellows
 - vi. Auxiliary Memberships
 - vii. Preferred Author Guidelines
 - viii. Index



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Impact and Prevalence of Musculoskeletal Injuries due to Accident at Work in Brazil, 2015-2020

By Bianca G D Oliveira, Iago O Braga, Leonardo C Borduchi,
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Abstract- Goal: Recognize the relevance of hospitalizations for musculoskeletal injuries due to accidents at work in Brazil.

Methods: It is a retrospective epidemiological study, qualitative/quantitative with secondary data analysis and cross-sectional typology in the public databases of the Ministry of Labor and Social Security, delivered by the Federal Government. Descriptors in health sciences: musculoskeletal injuries; accident at work; injuries due to accidents at work; workers; absenteeism.

Results: In Brazil, during 2015 to 2020, there is evidence of a high number of accidents at work resulting in 65.9% of musculoskeletal injuries. The most affected age was between 30-39 years, the male gender corresponded to 63.3% of the cases, upper limb injuries were the most prevalent, and 36.1 billion were spent in aids.

Keywords: *musculoskeletal injuries; accidents at work; injuries due to accident at work; workers.*

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Impact and Prevalence of Musculoskeletal Injuries due to Accident at Work in Brazil, 2015-2020

Prevalência E Impacto Das Lesões Osteomusculares Por Acidente De Trabalho No Brasil, 2015 - 2020

Lesões Osteomusculares Por Acidente De Trabalho No Brasil

Bianca G D Oliveira ^α, Iago O Braga ^σ, Leonardo C Borduchi ^ρ, Pedro A M O Siqueira ^ω
& Renan C Peccinelli [¥]

Abstract- Goal: Recognize the relevance of hospitalizations for musculoskeletal injuries due to accidents at work in Brazil.

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Results: In Brazil, during 2015 to 2020, there is evidence of a high number of accidents at work resulting in 65.9% of musculoskeletal injuries. The most affected age was between 30-39 years, the male gender corresponded to 63.3% of the cases, upper limb injuries were the most prevalent, and 36.1 billion were spent in aids.

Conclusion: Musculoskeletal injuries due to accidents at work have significant socioeconomic impacts, making essential the introduction of targeted social policies.

Keywords: musculoskeletal injuries; accidents at work; injuries due to accident at work; workers.

I. INTRODUCTION

The International Labor Organization (ILO) stipulates that approximately 317 million accidents at work occur annually in the world, with around 321,000 deaths as a result of these accidents. Additionally, an average of 2.02 million deaths are caused by work-related diseases.¹

Accident at work is configured as bodily injury or functional disorder that causes death, loss or reduction, permanent or temporary, of work capacity, in

the exercise of work when in service for the company or insured persons, described in the Brazilian law 8213/91, article 19.²

In Brazil, it manifests itself with a high rate of occurrences. On September 22, 1977, the Ministry of Labor created the law 6514, which guarantees safety and occupational medicine. The Brazilian labor legislation (Consolidação as Leis do Trabalho - CLT), modifies part-time work and extends the time limit, in addition to facilitating the extension of the food benefit program (Programa de Alimentação do Trabalhador - PAT).³

In 2002, a network of assistance and surveillance services in workers' health (Rede Nacional de Atenção Integral à Saúde do Trabalhador - RENAST) was created in Brazil, which disseminates actions aimed at health integrated into the services of the Brazilian public health system (Sistema Único de Saúde - SUS), through specialized reference centers in workers' health (Centros de Referência em Saúde do Trabalhador - CEREST). It is a national network with the goal of programming assistance, surveillance, prevention and health promotion actions. In the national scene, from 2009 to 2018, 752.777 cases of serious and fatal accidents at work were registered in the notification system (Sistema de Informação de Agravos de Notificação - Sinan), in which Brazil ranks 4th in the world with death outcome.⁴

Musculoskeletal injuries triggered by work have terms such as repetitive strain injuries (RSI) and work-related musculoskeletal disorders (WMSD), adopted by the Brazilian Ministry of Health and Ministry of Social Security (MPAS). In addition to direct, indirect or commuting to work trauma.⁵ The occurrence of work accidents has a direct relationship with the age group, as the economically active population is affected, since the injury may or may not be repairable, fostering temporary absolute or partial disabilities, or permanent for work. And when definitive, it can be partial, absolute for the usual work or absolute for any and all types of work.⁶

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Absolute Temporary Professional Incapacity (ITPA) refers to the impediment to perform the usual professional activity including hospitalization and absolute rest without prejudice to the specificities of the profession concerned, defined by days. Partial Temporary Occupational Disability (ITPP) corresponds to a reduction of at least 50% of the functional capacity for the usual performance, even with limitations. It is translated into number of days and disability rates, using clinical records, physical examination, history and the requirements of their usual profession, or after 18 consecutive months of ITPA. Permanent disability is conceptualized as loss of work capacity due to functional interruption of one or more systems, with different degrees determined by sequelae, in a three-dimensional manner.⁴

The habits seen during operational activities stand out, such as: repetitive movements, prolonged working hours and the absence of periodic breaks, productivity requirements, high muscle strength performance, poor posture adequacy, overloaded body segments and a higher degree of demand. Besides intense pace of work, stressful environment of charges, finding inadequate equipment and instruments of work, exposing the patient inappropriately to the risk of injury.^{7,8,9}

II. METHODS

The present scientific work is a retrospective clinical investigation, through a qualitative and quantitative epidemiological study, whose data were obtained through consultations in the databases of the Brazilian Ministry of Labor and Social Security, made available by the Federal Government, at the electronic address (<https://www.gov.br/trabalho-e-previdencia/pt-br/assuntos/previdencia-social>), accessed throughout the research period. As this is a public domain database, it was not necessary to submit the project to the Research Ethics Committee.

The research gathers health data and involves the category of musculoskeletal injuries caused by accidents at work, selecting the group "Anuário Estatístico de Acidentes de Trabalho - AEAT", as well as the option "Subseção C - Acidentes de trabalho segundo o CID" specifying "Brasil" and the year to be analyzed.

The platform Observatório de Segurança e Saúde no Trabalho - Smartlab, available at the electronic address (<https://smartlabbr.org/sst>), was used to survey public spending on sickness and accident benefits for occupational accidents during the study period. The groups "despesa - INSS", "prevalência dos afastamentos" and "frequência dos afastamentos" were selected.

The study sample was work accidents involving musculoskeletal injuries in Brazil during the years 2015

to 2020. Traumatic mechanisms that had no correlation with musculoskeletal injuries were not included in the sample. Microsoft Excel 2019 was used to analyze and prepare the data and graphs. The search period in the databases used was from February 1, 2022 and June 20, 2022, with 30 references used.

The inclusion criteria used in the search for articles in the databases searched were: occupational accidents associated with orthopedic injuries; works related to the costs involved in these occurrences; repercussions after occupational traumas; safety in the work environment; articles whose reading of titles and abstracts related to the theme proposed by the study; articles in Portuguese, English and Spanish.

Regarding the exclusion criteria, articles that were not related to the research topic were removed: non-orthopedic work traumas; articles whose language differed from those mentioned above; reading titles and abstracts of scientific papers that had no association with the main objectives of this study.

To build the theoretical foundation, articles available on the website of the Brazilian Ministry of Labor and Social Security were used, as well as articles selected from the SciELO, PubMed and LILACS databases. The terms "lesões osteomusculares", "acidente de trabalho", "lesões por acidente de trabalho", "trabalhador" e "absenteísmo" were chosen from the platform Descritores em Ciências da Saúde at the electronic address <<https://decs.bvsalud.org/>>.

III. RESULTS

Occupational accidents registered during the years 2015 to 2020 comprised 3.384.319 cases. Of this number, 2.232.945 (65.9%) were found to have musculoskeletal injuries due to accidents at work (Picture 1).¹⁰

The most affected age group was 30 - 39 years with 31.5% of the registered cases, followed by 20 - 29 years (28.6%), 40 - 49 years (22.1%) and lastly, 50 years or more with 15.3% of the records. In relation to sex, the total number of men affected in the study period is 2.244.887 (63.3%), being more commonly involved in this context, with a lower manifestation in women with 1.137.911 (33.6%) cases. 1.521 registrations did not have gender as a notified variable. It is evident the disparity of involvement between genders in relation to accidents at work, being in absolute values a number of 1.106.976 and in percentage amount corresponding to 29,7%.¹⁰

Upper limb injuries were the most prevalent with 53.2% of musculoskeletal trauma cases, lower limb injuries comprised 34.2%. In third place was the spine, with 8.5% of records. Lastly, synovitis and tenosynovitis accounted for 1.3% of injuries. Affections involving unspecified parts comprised 2.6% of cases.¹⁰

We can specifically highlight the main musculoskeletal injuries, being more recurrent in the upper limb the injuries and/or fractures of the wrist and hand, corresponding to 23.8% of the injuries analyzed. This was followed by lower limb injuries, particularly dislocations, sprains and strains of the joints and ligaments of the ankle and foot (6.9%) and fractures of the leg including the ankle (5%). Concerning spinal disorders, dorsalgia is the main symptom (5.5%), and the main associated injury is intervertebral disc dysfunction corresponding to 1% of reports.¹⁰

When it comes to the classification of occupational accidents, 61.6% of the cases were typical accidents, 18% were commuting accidents and 1.7% were considered work-related diseases. Of the cases analyzed, 414,919 (18.6%) did not have a register on the Brazilian social insurance institute (INSS) by the corresponding document (Comunicação de Acidentes do Trabalho - CAT) (Table 1).¹⁰

During the 6 years of analysis, expenditures on occupational accidents were accounted for, with 14.3 billion reais paid through sickness benefits and 21.8 billion reais for accident benefits (Picture 2).¹¹

Of the 1.250.086 accident social insurance benefits granted during the period, 73,5% were for victims of musculoskeletal injuries due to accidents at work, of which 13,4% were for patients suffering from wrist and hand fractures, which was the main cause for granting the aid (Table 2).¹¹

During the period from 2015 to 2020 there was an accumulation of 227.4 thousand days away from the work environment, with a financial contribution being granted to the victims through sickness benefits for accidents that occurred in the labor environment. Configuring high costs generated by this situation, mainly by the decrease in productivity due to worker absenteeism, and thus generating losses to the sector in which it is employed. Moreover, health expenditures are directed to develop actions aimed at resolving the problems in order to guarantee the cure, damage control, rehabilitation and reintegration of this worker in his work environment.¹¹

IV. DISCUSSION

Accidents at work are classified as typical, commuting and work-related diseases, caused by recklessness, malpractice and/or negligence. The malpractice consists in the execution of an action, without really mastering it, which may cause civil and criminal liability among those involved, in case of any type of accident. Recklessness is to act without caution, with the due knowledge, however, leading to casualty and negligence results from voluntary omission.¹² Causal agents are divided into large groups: chemical, physical, biological, ergonomic and commuting/traffic risks.¹³

Typical accidents are those arising from the professional activity performed by the injured worker and commuting accidents occur between the insured person's home and place of work. Work-related illnesses include work-related pathologies, those triggered by the specific performance of a particular work activity. Regardless of the nature of the accident, it is of great importance that all accidents are registered with the INSS through the CAT so that the worker has access to all his rights determined by law.¹⁴

Physical occupational risks mainly include falls, either from their own height or from altitude. They are associated with inadequate posture, prolonged working hours, stress, inadequate lighting, anxiety and other psychiatric disorders, fatigue and defective individual and collective protection equipment or the non-use of these safety devices. A Standard Regulatory number 35 was created by the Brazilian Federal Government, specifically by the Ministry of Labor and Employment, in order to stipulate mechanisms for managing the safety and health of workers for all work activities developed at height with risk of falling.¹⁵

Chemical incidents are linked to the production/consumption of substances and occur as an emission, fire or explosion involving one or more dangerous chemicals, not only in the industrial production process, but in transportation and storage. The potential for severity and extent of their effects include teratogenesis, carcinogenesis, mutagenesis and damage to specific target organs.^{16,17}

Explosions are the events with the highest frequency of large numbers of immediate deaths, caused by burns, trauma and/or suffocation by the gasses released after the explosions.¹⁸ In fires, besides the radiation of heat and additional explosions, there are also the risks of combustion itself triggering the emission of multiple gasses and toxic smokes that generate dispersion and can reach large extensions and a greater number of people, constituting the predominant form of environmental and occupational exposures.¹⁹ The prevention of these accidents is done through the control of work equipment associated with the functions performed, monitoring and maintenance. Also the use of all personal protective equipment (PPE) and adequate professional training of the worker.

Trauma to the hand and/or wrist is the leading cause of musculoskeletal injuries in Brazil, as a result of negligence in the use of protective materials, such as gloves and safety sleeves. This equipment not only protects against cutting and piercing (mechanical) agents, but also abrasive, excoriating and thermal agents. The good state of use, the appropriate size for each professional and the guidelines on the correct use of the equipment are of paramount importance for its effectiveness.²⁰

Biological risk occurs due to environmental factors and working conditions, in addition to

characteristics such as time of service, training and professional category. Thus, these include contact with blood and secretions, microorganisms such as viruses, fungi, protozoans and bacteria, handling of sharps, among other associated items.²¹ They involve workers who carry out work activities related to health sciences, which present continuous exposure to the contagion of diseases. Other labor classes also exposed are: garbage collection, general services, sterilization, rescue and/or security operations, among others.²²

Ergonomics is a science that studies and applies standards for better work performance with machines, equipment and working conditions. The goal is to provide an environment compatible with the required needs, reducing risks, whether physical, emotional, mental and/or structural. Thus, it is necessary to recognize the profile of the employees and the type of activity in question, including posture, organizational management, cognitive assessment process and accessibility.²³

Synovitis and tenosynovitis accounted for 56.952 cases of occupational diseases. They were mainly associated with females, sewage workers, radio and TV activity, manufacturing of computer equipment and electronic products, and financial service activities.²⁴ Edema and hyperemia associated with pain caused by inflammation can result in limitation of the affected joint movement, which leads to compromised execution of certain activities, such as exercising work activity.

Thus, the performance of the ergonomic analysis of work (AET) is essential to understand the real needs of professionals and the company, allowing to identify, minimize or even extinguish the existing ergonomic risks. It is necessary to correct and evaluate posture in work activities, handling of materials, execution of movements, projection of positions of the field of action, communication, group work, network organization, time of performance, quality management; required mental load, decision-making processes, stress, and possible musculoskeletal disorders, to obtain the best human performance.²³ Investing in ergonomics provides more safety, health and quality of life for the worker, as well as better results and productivity for the company.

Back pain (Brazilian ICD M54) is the most common symptom of accidents at work and is related to spinal disorders. It is the second leading cause of permanent absence from work, as well as being responsible for decreased performance, fatigue and even temporary absences for full recovery. Such problems are linked to body overload in high-impact occupations, repetitive execution and/or weight loading on the axial skeleton and improper sitting posture. Some professions are more related to this type of injury, such as machine operators, repair, maintenance, production and industrial services.¹⁰

Body overload secondary to inadequate sitting posture is due to the fact that the seat is usually higher than it should be, which causes pain as a result of hip compression and improper support for the ischial tuberosities (because of the adjustment). Knee and thigh complaints result from prolonged contraction of the lower limb muscles combined with difficulty in venous return. The blood flow can be strangled when it rests on the edge of the seat, causing blood capillaries to bulge into the epidermis, as well as numbness in the lower limbs and even the appearance of varicose veins. Investment in ergonomic seating is therefore essential to preserve workers' health.²⁵

Lastly, commuting accidents are those that occur between home and work, accounting for 403.387 cases.¹⁰ Most of these injuries are caused by motorcycles, with a higher number of leg fractures (Brazilian ICD S82) and consequent losses capable of generating disability, death, absence from work and prolonged hospitalization, configuring a socioeconomic impact. In addition to causing other types of trauma, such as abrasions, bruises, contusions, neurological and/or spinal cord injuries, brain injuries and lacerations.²⁶

It reflects, so, the need to apply traffic and safety education, encouraging the use of protection equipment (helmets and seat belts), awareness about the consumption of alcohol and other drugs associated with driving, based on the Brazilian Ordinance No. 1,820, of August 13, 2009, which provides for the rights and duties of health users under current legislation. And everyone has the right of access to goods and services ordered and organized to ensure the promotion, prevention, protection, treatment and recovery of health. Companies and/or insurers are required to comply with specific occupational health and safety standards, made through specific reports in accordance with national labor law. These are designed to ensure periodic medical examinations to monitor work capacity and health, notification of accidents to the INSS, prevent, identify and treat risks. It also provides adequate assistance and treatment to the individual who has suffered an injury.

Examples of the above reports are: risk management program (programa de gerenciamento de risco - PGR), technical report on working conditions (laudo técnico das condições de trabalho - LTCAT) and occupational health medical program (programa médico de saúde ocupacional - PCMSO). The PGR goal is to identify situations that are harmful to people, institutions and the environment at an early stage. The main objective is to establish a set of measures to prevent, identify and reduce the occurrence of unwanted events, which may lead to negative effects of physical or psychological aspect, in order to establish immediate measures, thus minimizing the damage.²⁷

The technical report of working conditions (LTCAT) has as objective to identify, analyze and record the harmful agents present in the work environment, in addition to concluding if these can produce unhealthiness or special retirement rights for employees. The environmental assessment where the work activities are performed by the company's employees are analyzed for aspects of unhealthiness and dangerousness.²⁷ The main objectives of the occupational health medical program (PCMSO) are the prevention, monitoring and early identification of work-related health problems, and promoting the preservation of workers' health in order to provide maximum comfort, safety and productivity efficiently in the workplace.²⁸

Accidents at work have repercussions on workers, generating costs for the State and the employer. In more serious situations, the INSS is responsible for paying benefits such as accident sickness benefit, accident benefit, professional and personal habilitation and rehabilitation, disability retirement and death pension. In these cases, the employer is responsible for resolving the legal, economic, social and social security situations; it also has to bear the costs in cases of less serious accidents, since it is responsible for paying the salary of workers on sick leave up to the fifteenth day since the work accident occurred. These expenses negatively impact several sectors, generating high costs for the health and labor field, being associated with the disabilities generated by the injuries that produce temporary and / or permanent disabilities depending on the degree of involvement, being added to this, the loss of productivity due to the days of absenteeism in the work environment.²⁹

The demand for medical care after occupational accidents is important and should be done as soon as possible, so that treatment is instituted in an appropriate time and manner, however, access to care is compromised, due to lack of demand, difficulties in scheduling appointments in public health services and / or inaccessibility to financing for private care or medical insurance. In addition to these factors, the quality of life of these patients is compromised, since after work accidents the psychological damage and functional limitations have repercussions on the well-being and balanced social life, compromising the reintegration of these individuals in the social and labor environment.³⁰

V. CONCLUSION

Given the facts above, the great socioeconomic relevance of the impacts of work accidents with orthopedic consequences is evident. Expenses for prevention, treatment, diagnosis, sequelae and rehabilitation services are high. This reinforces the need for the application of public policies directed to the inspection and reduction of risks, criminal action for companies that do not comply with the rules and

adequate regulation and demand by workers of their rights. The applicability and enforcement of occupational safety laws is the duty of the State, since maintaining the health of the individual is a constitutional right.

Risk exposure increases the chance of developing a series of health problems, such as infectious diseases, loss of temporary or permanent functional capacity, disability, job insecurity, anxiety, Post-Traumatic Stress Disorder (PTSD), suicide and/or death. Thus, these disorders compromise active participation in the labor market and their social interaction, bringing with them a deficit in the economy and distancing from society.

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Intraosseous Synovial Cysts of the Scaphoid Bone: A Rare Case of Fracture and Surgical Management

By Marouane Dinia, Yassine Ben Bouzid, Othmane Ibnoussina, Rida-Allah Bassir,
Monsef Boufettal, Jalal Mekkaoui, Mohamed Kharmaz, Moulay Omar Lamrani
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Abstract- Intraosseous synovial cysts (ISCs) are rare occurrences characterized by synovial proliferation within the bone. This article presents a case report of a 19-year-old patient with a carpal scaphoid bone fracture and an incidentally detected intraosseous cyst. The patient underwent surgical treatment involving careful curettage of the cystic cavity, addition of a spongy bone graft, and fracture stabilization. The histopathological examination confirmed the presence of an intraosseous synovial cyst. The patient achieved a satisfactory functional outcome, with early consolidation and resumption of daily activities. The study emphasizes the importance of accurate diagnosis and appropriate surgical management, highlighting the favorable prognosis and rarity of recurrences in intraosseous synovial cysts of the scaphoid bone.

Keywords: *intraosseous synovial cysts, scaphoid bone, fracture surgical management, histopathological examination, radiography and computed tomography.*

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Intraosseous Synovial Cysts of the Scaphoid Bone: A Rare Case of Fracture and Surgical Management

Marouane Dinia ^α, Yassine Ben Bouzid ^σ, Othmane Ibnoussina ^ρ, Rida-Allah Bassir ^ω, Monsef Boufettal [¥],
Jalal Mekkaoui [§], Mohamed Kharmaz ^χ, Moulay Omar Lamrani ^ν & Mohamed Saleh Berrada ^θ

Abstract- Intraosseous synovial cysts (ISCs) are rare occurrences characterized by synovial proliferation within the bone. This article presents a case report of a 19-year-old patient with a carpal scaphoid bone fracture and an incidentally detected intraosseous cyst. The patient underwent surgical treatment involving careful curettage of the cystic cavity, addition of a spongy bone graft, and fracture stabilization. The histopathological examination confirmed the presence of an intraosseous synovial cyst. The patient achieved a satisfactory functional outcome, with early consolidation and resumption of daily activities. The study emphasizes the importance of accurate diagnosis and appropriate surgical management, highlighting the favorable prognosis and rarity of recurrences in intraosseous synovial cysts of the scaphoid bone. Radiography and computed tomography are valuable tools in confirming the diagnosis and guiding treatment. Long-term monitoring is essential to detect any potential recurrences, and further research is needed to improve understanding of the pathophysiology and treatment options for these cysts.

Keywords: intraosseous synovial cysts, scaphoid bone, fracture surgical management, histopathological examination, radiography and computed tomography.

I. INTRODUCTION

Intraosseous synovial cysts (ISCs) are characterized by the presence of a specific radiological image and histology indicating synovial proliferation within the bone (1). Intraosseous synovial cysts of the scaphoid bone are an extremely rare cause of wrist and hand pain. The localization of this cyst specifically in the scaphoid bone is sparsely documented in the literature. This article presents a case report of a 19-year-old patient who experienced a carpal scaphoid bone fracture following a sports-related accident. Additionally, during the evaluation, an intraosseous cyst was incidentally detected.

II. CASE REPORT

It is about a 19-year-old patient with no notable medical history. He came to the emergency department of CHU Avicenne after sustaining an injury to his left upper limb during a sports accident, with his hand landing in hyperextension. During the interview, he mentioned having experienced previous injuries and suffering from chronic wrist pain for the past 3 months, which is relieved by symptomatic treatment with painkillers and non-steroidal anti-inflammatory drugs. Upon clinical examination, the patient exhibited slight limitation of wrist function, accompanied by swelling and filling of the anatomical snuffbox. Palpation elicited pain during thumb retroversion and wrist pronation, as well as tenderness upon pressure in the anatomical snuffbox.

The standard radiographic assessment revealed a scaphoid fracture with an underlying gap, suggesting the possibility of a cyst or pseudarthrosis of the scaphoid (*figure 1*). The wrist CT scan confirmed the scaphoid fracture with a probable intraosseous cyst (*figure 2*).

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Figure 1: The standard X-ray of the wrist, in frontal and oblique views, revealed a displaced fracture of the scaphoid on a lacunar image located in the middle portion of the scaphoid.

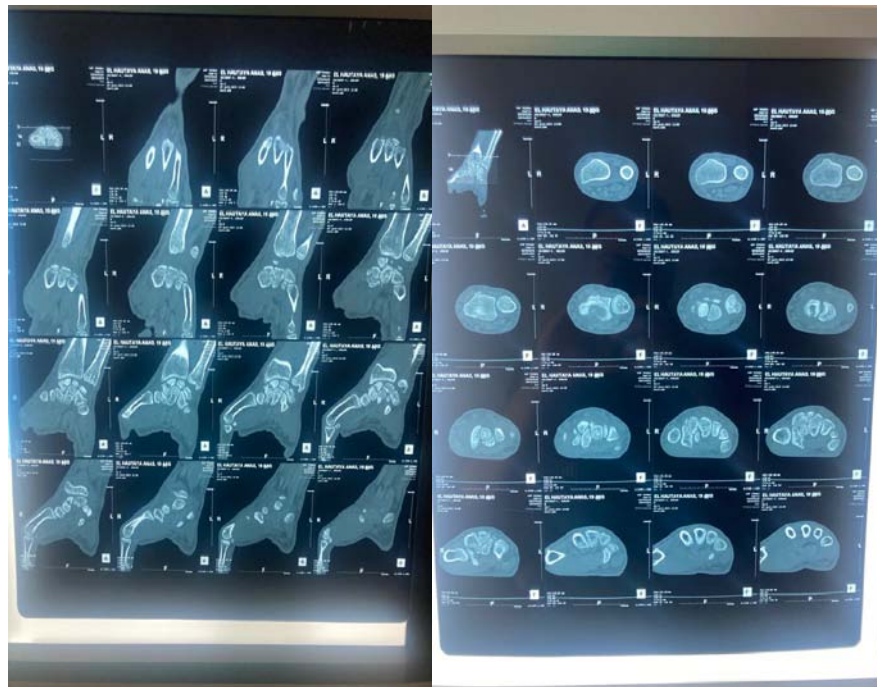


Figure 2: The computed tomography (CT) scan confirmed the scaphoid fracture and the localized and non-aggressive nature of the cyst.

The patient underwent surgery via an anterior approach. Careful curettage of the cavity was performed after distraction of the fracture site. The bone defect was filled with autologous cancellous graft harvested from the lower metaphysis of the ipsilateral radius. Fracture stabilization was achieved with 2 pins (*figure 3*). The histopathological examination of the curettage specimen showed that the cyst wall was lined with flattened fibroblastic cells resembling synovial cells, without true

epithelial appearance. There was no mucoid degeneration or myxoid transformation.



Figure 3: Postoperative radiograph after curettage, grafting, and stabilization with two pins.

The patient was immobilized for 2 months in a resin splint. After this period, the hardware was removed under local anesthesia. Several sessions of functional rehabilitation were initiated after plaster removal. At the latest follow-up at 6 months after treatment, the patient had regained good wrist function, with painlessness and resumption of leisure and professional activities.

III. DISCUSSION

Cysts of the carpal scaphoid are uncommon in daily practice. Most often, they are either mucoid cysts or synovial cysts. These cysts typically develop at an advanced age, with an average age of 41 and 47 years in the two largest series [2].

The pathophysiology of bone cysts remains controversial, with two main opposing hypotheses. Some authors argue that the bone cyst forms through synovial inclusion from the outside to the inside. Others suggest synovial metaplasia originating within the bone itself, potentially influenced by local microtrauma or ischemic phenomena [3,4].

Intraosseous synovial cysts can present in two distinct ways: they may not exhibit any symptoms or they can result in moderate pain that typically does not respond well to painkillers. Other clinical manifestations may arise due to complications associated with intraosseous synovial cysts [1, 5, 6], such as wrist swelling caused by the rupture of the cysts and the spread of its contents within the joint. Moreover, a pathological fracture can occur, exacerbating the pain [1,5].

From a radiological perspective, typical images show osteolytic lesions of a few millimeters in diameter, either solitary or multilobulated, accompanied by a peripheral rim of osteosclerosis [7]. This description corresponds to the lesion observed on our patient's

radiographs, along with a discontinuity at the scaphoid neck, indicating a pathological fracture due to weakening of the scaphoid neck. Computed tomography, whether performed with or without contrast agent injection, allows for precise determination of the nature of the intracystic contents and any cortical involvement [1,7]. It also helps establish a surgical protocol by specifying the most appropriate approach, including the preferred surgical access route.

The only patients requiring surgical intervention are those who experience persistent pain or swelling of soft tissues, as well as those with a pathological fracture, as in our case. Additionally, preventive intervention may be considered for lesions at risk of fracture due to their location (scaphoid neck) and volume (large geode with significant cortical thinning) [8]. The surgical procedure involves a thorough excision by curetting the contents of the cystic cavity as completely as possible. A spongy bone graft is systematically added, along with osteosynthesis if necessary, as recommended by most authors [9,10]. The functional prognosis is generally favorable, and recurrences are exceptional (5). In our case, we observed an early consolidation (55 days) compared to the usual timeframe of 3 months, with a highly satisfactory functional outcome.

IV. CONCLUSION

The functional prognosis of intraosseous synovial cysts of the scaphoid bone is generally favorable, with exceptional recurrences. In our case, we observed an early consolidation occurring in just 55 days compared to the usual timeframe of 3 months, with a highly satisfactory functional outcome. This case report highlights the importance of accurate diagnosis and appropriate surgical management for patients with

intraosseous synovial cysts of the scaphoid bone. Careful curettage of the cystic cavity and the systematic addition of a spongy bone graft, along with possible osteosynthesis, were recommended to ensure complete excision and optimal consolidation. Standard radiography and computed tomography were valuable tools in confirming the diagnosis and guiding the surgical treatment. Through appropriate management, the patient was able to regain satisfactory wrist function and resume daily activities. However, long-term monitoring is necessary to detect any potential recurrences. This study also emphasizes the importance of ongoing research and documentation of intraosseous synovial cysts of the scaphoid bone to improve understanding of their pathophysiology and treatment options.

Ethics approval and consent to participate

Ethical approval was not sought. Written consent was obtained from the patients.

Availability of data and materials

The datasets used and analysed during the study are available from the corresponding author.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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Knowledge, Attitude, and Perception Regarding the Application of Bioethical Principles in Students of the School of Dentistry, National University of Caaguazú, Paraguay, Year 2022

By Martinez-Gutierrez, Giselle, Cespedes-Santacruz, Gerardo Adrian
& Soto-Godoy, Claudia Liliana

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Abstract- Ethics and its principles are essential elements that all individuals must have as a guide for daily life. In the case of healthcare professionals, particularly dentists, due to the nature of the profession, which involves working with human beings, it also entails the application of a set of values such as respect, empathy, and also, a solid moral foundation with the sole purpose of ensuring the physical and emotional well-being of the patient. The study aims to identify the knowledge, attitude, and perception regarding the application of bioethical principles in students of the School of Dentistry at the National University of Caaguazú, Paraguay, in the year 2022.

Keywords: *bioethics; deontology; bioethical principles; pre-professional dental practice; humanized dental care.*

GJMR-H Classification: FOR Code: 1105



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Knowledge, Attitude, and Perception Regarding the Application of Bioethical Principles in Students of the School of Dentistry, National University of Caaguazú, Paraguay, Year 2022

Conocimiento, Actitud Y Percepción Sobre La Aplicación De Principios Bioéticos En Estudiantes De La Facultad Odontología, Universidad Nacional De Caaguazú, Paraguay, Año 2022

Martinez-Gutierrez, Giselle ^α, Cespedes-Santacruz, Gerardo Adrian ^σ & Soto-Godoy, Claudia Liliana ^ρ

Abstract- Ethics and its principles are essential elements that all individuals must have as a guide for daily life. In the case of healthcare professionals, particularly dentists, due to the nature of the profession, which involves working with human beings, it also entails the application of a set of values such as respect, empathy, and also, a solid moral foundation with the sole purpose of ensuring the physical and emotional well-being of the patient. The study aims to identify the knowledge, attitude, and perception regarding the application of bioethical principles in students of the School of Dentistry at the National University of Caaguazú, Paraguay, in the year 2022. An observational, cross-sectional descriptive study with a census-type sampling was conducted among fourth and fifth-year students. Data was collected by administering a survey to determine knowledge, attitude, and perception regarding the application of bioethical principles during dental clinical care. 73.21% of the respondents demonstrated MEDIUM LEVEL OF KNOWLEDGE, and 89.29% of the students exhibited AN APPROPRIATE ATTITUDE toward bioethical principles. 71% of the participants perceived that ETHICAL PRINCIPLES were ALMOST ALWAYS applied during pre-professional dental practice. In conclusion, nearly three-quarters of the respondents had a moderate level of knowledge about bioethical principles, and a slightly higher number showed an appropriate attitude. In terms of perception regarding the practical application of bioethical principles, nearly three-quarters of the respondents perceived that the bioethical principles were almost always applied during pre-professional dental practice.

Keywords: *bioethics; deontology; bioethical principles; pre-professional dental practice; humanized dental care.*

Resumen- La ética y sus principios son elementos esenciales que todos los individuos deben tener como guía para la vida diaria. En el caso de los profesionales de la salud, en particular los odontólogos, debido a la naturaleza de la profesión, que es trabajar con seres humanos, implica, además, aplicar de la técnica odontológica, un conjunto de valores, tales como el respeto, la empatía y agregando un

sólido andamiaje moral con el único fin de asegurar el bienestar físico y emocional del paciente. El objetivo de este estudio fue identificar el conocimiento, la actitud y la percepción sobre la aplicación de los principios bioéticos en estudiantes de la Facultad de Odontología de la Universidad Nacional de Caaguazú, Paraguay, año 2022. Se realizó un estudio observacional, descriptivo de corte transversal con un muestreo tipo censal entre los alumnos del cuarto y quinto curso. Los datos se recolectaron aplicando una encuesta para determinar los conocimientos, la actitud y la percepción para la aplicación de los principios bioéticos durante la atención clínica odontológica. El 73,21% de los encuestados alcanzaron un CONOCIMIENTO MEDIO y 89,29% de los estudiantes mostraron una ACTITUD ADECUADA sobre los principios bioéticos; el 71% de los participantes percibe que CASI SIEMPRE se aplican los principios éticos durante la práctica odontológica pre profesional. En conclusión, casi tres cuartas partes de los encuestados el conocimiento sobre los principios bioéticos fue regular, en un número ligeramente superior, la actitud adecuada y en cuanto a la percepción sobre la aplicación práctica de los principios bioéticos también casi tres cuartas partes de los encuestados perciben que casi siempre se aplican los principios bioéticos durante la práctica odontológica pre profesional.

Palabras clave: *bioética; deontología; principios bioéticos; práctica preprofesional odontológica; atención odontológica humanizada.*

I. INTRODUCTION

In the area of healthcare, every scientific discipline must continually demonstrate its social commitment and incorporate it into its purposes. Therefore, in the case of dentistry, it is crucial to consider that dental clinics operate in a multifactorial environment where the social responsibility of the profession, the social function of the dentist, and their social awareness must be promoted.

Hence, it is essential to highlight that Bioethics is an interdisciplinary theoretical-practical study whose objective is to address the moral challenges technology

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poses to the development of life, health, and the environment (Cantú-Martínez, 2019).

For dentists, particularly, due to the meaning of their relationship and interaction with the patient, their enhanced knowledge of clinical and therapeutic biopsychosocial aspects, compels them to extensively develop the ethical component during professional practice (Villacis et al., 2019).

Therefore, it is necessary to find ways for students to incorporate ethical reflections and foundations into their ways of acting, behaving, and putting into practice what they have learned to emphasize and conceive ethics as a foundation during healthcare and scientific research, thereby promoting the formation of comprehensive professionals capable of making informed decisions and critically reflecting on situations that require it in their daily practice. These qualities should not be limited to codes, rules, and etiquettes; they involve the consistent adoption of ethical principles and professional virtues, such as respect for the dignity of the human person and the pursuit of well-being for humanity.

In Latin America, integrating Bioethics into university curricula remains an outstanding issue. Therefore, in some cases, students graduate without optimal preparation for ethical and moral reasoning (Barreto & Durán, 2021). The absence of such training during undergraduate studies can result in dehumanized healthcare practice.

The school is a fundamental entity in the comprehensive training of dentists; hence, they must consider developing competent professionals cannot occur without ethical and moral education (Jácome Liévano, 2019).

The literature reports deficiencies and inefficiencies related to the lack of Bioethics knowledge among health sciences students. Also, healthcare institutions may be facing a loss of values in dental care (Morales et al., 2021).

In Quito, Ecuador, in 2016, Palacios conducted a study on the level of knowledge and application of ethical and moral duties in pre-professional preparation among ninth-semester students at the School of Dentistry, Central University. The study found that 44% of the surveyed students had a moderate level of knowledge, and only half of the participants demonstrated the application of ethical duties during pre-professional practice (Palacios, 2016).

Villacis et al. (2019) conducted a study in 2019 to assess students' knowledge of dental bioethics and its application in clinical practice at the Dental Care Unit of the Regional Autonomous University of the Andes. A lack of dental bioethical principles in students during pre-professional practice toward their patients was identified. The study's results showed a low level of knowledge about dental bioethics. They suggested

improving the curriculum to provide students with better bioethical training.

The education provided to students should be based on current realities and should be focused on responding to everyday problems during professional life. It is necessary to analyze the interests and values that will later guide and be the fundamental characteristic of the pre-professional and professional development of the dentist, such as honesty and responsibility for their actions, reflecting the competence of a comprehensive professional. These qualities will make a difference among graduates because, although they all acquire up-to-date knowledge and clinical skills in dentistry during both undergraduate and postgraduate studies, what distinguishes a comprehensively trained professional is their attitude and the correct decision-making, i.e., critical reflection on moral aspects involved in bioethical decisions.

This research focused on identifying the knowledge, attitude, and perception regarding the practical application of bioethical principles in students of the School of Dentistry at the National University of Caaguazú, 2022.

The research provided valuable information about the positive and negative aspects of Dentistry students regarding Bioethics and its application in clinical practice. With this information, the faculty may take action to strengthen and improving the training of future dentists. Besides, it promotes reflection and ethical decision-making to protect patients' rights and avoid ethical-legal conflicts, always aiming to provide humane and high-quality patient care.

II. MATERIALS AND METHOD

The study was observational, descriptive, and cross-sectional. It was conducted at the School of Dentistry of the National University of Caaguazú, in 2022. The study population consisted of fourth and fifth-year students. Using a census-type sampling, all students were recruited, resulting in a sample size of 56 units of analysis. All enrolled students were included, and the exclusion criterion was the explicit desire of individuals not to participate.

Data collection was carried out through a survey using a questionnaire similar to the one used by Salamanca (Salamanca & AFOM, 2017). The instrument consisted of 12 questions to assess general knowledge of Bioethics, 10 questions to measure attitude, and ten questions to determine perception regarding the practical application of Bioethics during the provision of dental services in the school clinic.

Using a Likert-type scale, the following categories were assigned:

Knowledge of bioethical principles: HIGH: 9-12; MEDIUM: 5-8; LOW: 1-4.

Attitude: APPROPRIATE ATTITUDE: 7-10; INAPPROPRIATE ATTITUDE: 0-6.

Perception regarding practical application: ALWAYS: 10; ALMOST ALWAYS: 7-9; RARELY: 0-6.

The study was conducted following basic ethical principles for non-experimental research. The confidentiality of the subjects and the data they provided were maintained by coding the questionnaires so that they could not be linked to the respondents. Participation in the research was voluntary, giving students the autonomy to decide whether or not to

participate in the study without any harm or repercussions. Once the research was finished, the subjects received a copy of the draft of the Code of Ethics and Dental Deontology of Paraguay in digital format.

III. RESULTS

The participants ranged from 21 to 31 years old, with a median age of 24 years. The female gender prevailed at 66% (37).

Level of knowledge about bioethics among fourth and fifth-year students of the Santo Tomás de Aquino Faculty at the National University of Caaguazú, 2022. N=56.

Level of knowledge	N	F
Low	6	10.71
Medium	41	73.21
High	9	16.07
Total	56	100

68% correctly identified the concept of Bioethics, 83% acknowledged its characteristics, 86% recognized the principles, and 62% responded correctly to the use of Informed Consent. They correctly identified

the concepts of Negligence (79%), Ineptitude (18%), Incompetence (65%), and Recklessness (23%). In general, 73.21% (41) of the students achieved a MEDIUM level of knowledge.

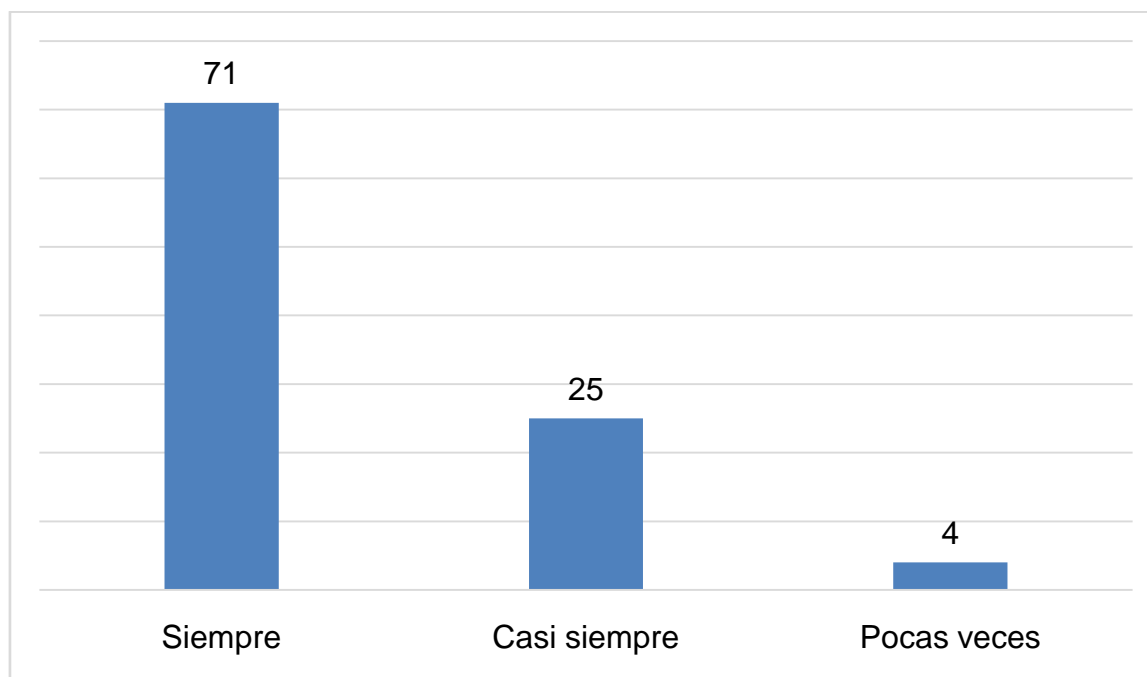
Attitude towards bioethical principles among fourth and fifth-year students of the Santo Tomás de Aquino Faculty at the National University of Caaguazú, 2022. N=56.

Attitude	N	F
Adequate	50	10.7
Inadequate	6	89.3
Total	56	100

The items with the highest percentages of appropriate responses were as follows: consideration of cost-benefit analysis of treatment from the patient's perspective (98%); use of clear and straightforward language when explaining the therapy (100%); adherence to professional confidentiality, whereby no information about the diagnosis and, or health status of the patient should be disclosed (100%); and equal care for all regardless of the patient's social, economic, and health condition (99%).

89.29% of the students demonstrated an adequate attitude towards bioethical principles.

Perception of the practical application of bioethical principles among fourth and fifth-year students of the Santo Tomás de Aquino Faculty, National University of Caaguazú, 2022. N=56.



Regarding the perception of the practical application of bioethical principles, 62.5% perceive that the risk-benefit is ALWAYS considered when choosing treatment for patients. 46.4% perceive the managing of infectious waste is ALWAYS appropriately handled, and 35.7% perceive that informing the patient in case of a previous mistake is ONLY SOMETIMES done.

41% of the respondents said that, in their opinion, informing the patient always happens if an unintentional error occurs during treatment. Regarding patient care, 57.1% perceive that everyone is ALWAYS treated the same way.

According to the respondents' perception, they are ALMOST ALWAYS compassionate (46.3%) and merciful (35.7%). 75% agreed that they do not engage in malpractice or unnecessary work, and the same percentage (75%) agreed that the faculty clinic provides patients with quality, dignified, and responsible care.

In 55.3% of cases, they perceived that ALMOST ALWAYS there is an excellent relationship among patients, students, teachers, and administrative staff, and 41% said that ethical dilemmas are ALWAYS identified, and Ethical standards are applied according to the dental code of ethics.

In general, 71% of the respondents perceive that the bioethical principles are ALWAYS followed during dental clinical care for patients treated at the faculty.

IV. DISCUSSION AND COMMENTS

The present research found that 73.21% of the respondents reached a MEDIUM level of knowledge about bioethical principles, while the remaining 16.07% positioned themselves at a HIGH level of understanding. These results align with those reported by Flores in Peru, who found that 76% of the respondents had regular knowledge (Flores Huamaní, 2018). On the other hand, when comparing these results with other studies in the same research area, a significant difference is observed. Aguilar, for instance, reported a low knowledge level of 61.5% regarding ethics and bioethics among dentistry students (Aguilar Portocarrero, 2017). In contrast, Eulogio's study findings reported 97.8% of participants with fair knowledge of Bioethics and its application in odontology (Eulogio Ccaccya, 2018).

In the present research, only 10.71% of the surveyed students fell into the low knowledge category, which is opposed to what Taquire found, where 54.9% of dentistry faculty students had a poor level of knowledge (Taquire Almerco, 2019). The literature consulted reaffirms the significant disparity in knowledge about Bioethics and its principles among both undergraduate and postgraduate dentistry students throughout South America (Quispe, 2015; Navarro, 2016).

This research found that 89.29% of the participants had a proper attitude, which coincides with the findings of Brítez, who reported 94% of respondents with a fair attitude (Brítez, 2011). Conversely, Acosta and

colleagues found an appropriate attitude in only 56% of the respondents (Munive, Romero, & Soto, 2015).

Regarding the perception of the practical application of bioethical principles, it was found that a higher percentage almost always values these principles. Mayurí, in a similar study, found that 50% of the respondents claimed to almost always practice bioethical principles (Mayurí & Alberto, 2017).

It would be essential to implement actions to improve these figures and raise greater awareness among future professionals during their academic training about the importance of understanding and applying bioethics in our professional lives.

V. CONCLUSIONS

A significant portion of fourth and fifth-year students at FOUNCA achieved a MEDIUM level of knowledge regarding bioethical principles, while almost all displayed an appropriate attitude towards them. Concerning the practical application of these principles in the provision of dental clinical services, the majority perceived that the bioethical principles are ALMOST ALWAYS applied in patient's treatment.

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7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

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11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.



20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.



The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Topics	Grades		
	A-B	C-D	E-F
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<i>Introduction</i>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



INDEX

A

Abrasive · 3
Adherence · 14

C

Combustion · 3
Competent · 13

D

Disparity · 2, 15
Disseminates · 1

I

Impediment · 2

P

Pronation · 8

R

Repercussions · 2, 5, 14

S

Stipulate · 3
Surveillance · 1



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