Universidad Europea

# GRADUATION PROJECT

## *Degree in Dentistry*

# PROFESSIONAL LIABILITY IN DENTISTRY: ANALYSIS OF SURGICAL TREATMENTS

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**ABSTRACT**

**Introduction:** Dental implants are used to replace missing teeth, but errors can occur during the surgical treatment, leading to the need for professional liability insurance for dentists. The importance of professional liability insurance cannot be overstated, as malpractice suits can occur to dentists globally for various different treatments; **Objectives**: The main objective of this study is to identify and review sentencing which relates to dental implant failures in Spain, whilst examining the liability of patients and determining if malpractice has occurred; **Methodology:** This retrospective study was conducted from January 2023 to March 2023, were the analyse of Spanish second instance judgments was undertaken which focused on the professional liability of dentists in surgery and implants in civil law from the years 2020 to 2022 inclusive. Seventeen second instance sentences were included in this study;12 from 2020, 3 from 2021 and 2 from 2022. The data, which was collected from the Aranzadi Institucionex, stored in an Excel spreadsheet, and analysed later for results; **Results:** From the 17 sentences included in this study, 12 cases involved female patients (70.6%) and 5 cases involved male patients (29.4%). The majority of cases (82.3%) had problems with the implant, whilst 17.6% had errors in the implant prostheses field, with diagnostic errors occurring as frequently as treatment errors. The average compensation awarded in these cases was 29,425.51 Euros; **Conclusions:** The study concluded that women are more likely to file medical malpractice claims against dentists in comparison to men. The average compensation between all the patients was 29,425.51 Euros. However, it can be noted that, averagely, women received more than double the amount of medical compensation compared to men.

**Keywords:** Dentistry, Implant, Liability, Malpractice, Implant Prosthetics, Surgical Dentistry

**RESUMEN**

**Introducción:** Los implantes dentales se utilizan para reemplazar los dientes perdidos, pero pueden ocurrir errores durante el tratamiento quirúrgico, lo que lleva a la necesidad de un seguro de responsabilidad profesional para los dentistas. No se puede subestimar la importancia del seguro de responsabilidad profesional, ya que los dentistas de cualquier parte del mundo pueden sufrir demandas por mala praxis con diferentes tratamientos; **Objetivos:** El objetivo principal de este estudio fue identificar y revisar las sentencias relacionadas con los fracasos de implantes dentales en España, al mismo tiempo que se examina la responsabilidad de los pacientes y se determina si se ha producido una mala praxis; **Metodología:** Este estudio retrospectivo se realizó desde enero de 2023 hasta marzo de 2023, analizando sentencias de segunda instancia españolas que se centraron en la responsabilidad profesional de los dentistas en cirugía e implantes en el derecho civil de los años 2020, 2021 y 2022. Diecisiete sentencias de segunda instancia. se incluyeron en el estudio, con 12 de 2020, 3 de 2021 y 2 de 2022. Los datos se recopilaron de Aranzadi Institucione, se almacenaron en una hoja de cálculo de Excel y se analizaron para obtener resultados; **Resultados:** De las 17 oraciones incluidas en el estudio, 12 casos fueron de mujeres (70,6%) y 5 casos de hombres (29,4%). La mayoría de los casos (82,3%) tenían problemas con el implante, mientras que el 17,6% tenían errores en el campo de la prótesis sobre implantes, ocurriendo errores de diagnóstico con la misma frecuencia que errores de tratamiento. La indemnización media otorgada en estos casos fue de 29.425,51 euros; **Conclusión:** El estudio concluyó que las mujeres son más propensas a presentar demandas por negligencia médica contra los dentistas que los hombres. La compensación media entre pacientes fue de 29.425,51 euros. Sin embargo, se observó que, en promedio, las mujeres reciben más del doble de la cantidad de compensación médica en comparación con los hombres.

**PALABRAS CLAVE:** Odontología, Implante, Responsabilidad, Negligencia, Prótesis sobre implantes, Odontología Quirúrgica.

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# 1. INTRODUCTION

## 1.1 Surgery

Oral surgery is identified as any surgical treatment that is located around the head area including the neck, jaw, soft and hard tissues of the oral cavity. To proceed with dental surgery the dentist must undergo further years of training to complete certain treatments. Some surgical procedures even require an additional degree in medicine due to the invasive nature of such treatments (1) and due to the complex nature of the anatomical structures of the oral cavity and how they affect not only physiological functions but also aesthetics. Surgery is a massive part of dentistry as it can help fix various issues patients may be having. Surgeries can either be functional or reparative depending on the end goal. Over the years the dental field has developed many new surgical methods which are improved, less invasive and have a higher chance of success (2). One of the new concepts is the placement of dental implants which help successful rehabilitation in terms of 'speech, mastication and facial aesthetics' (3). An overview will be undertaken of dental implants as a whole and how they can help but also the repercussions if the surgical treatment fails.

## 1.2 Dental implants

"Every tooth in a man's head is more valuable than a diamond ", a line written in Miguel de Cervantes famous book 'Don Quixote' from 1605. More than 400 years later this statement still holds true even though the treatment selection within dentistry has increased immensely due to the wide availability of prosthetics and even more recently in the advancement of dental implants. Nonetheless, there is no treatment which compares to our natural teeth where they can be replaced to achieve the same degree of functionality and aesthetics (4). However, in some scenarios the need for implants is necessary. The question arises; What is an implant? A dental implant is a prosthesis used to replace the empty space in patients that have full or partial edentulism within the upper or lower arcade. They are usually made with alloplastic material which is synthetic, biocompatible and inorganic material that promotes osteoconduction within the bone. These alloplastic materials work in conjunction with autologous bone grafts (cells coming from themselves) to provide the best chance of implant survival (5,6).

### 1.3 The medical history in dental implants

Like other professions, a dentist must dedicate time for planning to achieve the best final product similar to an architect building a house. Before placing the implant, a medical evaluation should be done to assess if a patient could potentially suffer from systemic diseases that could be either absolute or relative contraindications [7].

In cases where the patient has absolute contraindications which can include; myocardial infarction less than 6 months, active cancer treatment (radiotherapy and chemotherapy) , patients who take anticoagulants and have an INR higher than 3.5 and finally immunosuppressed patients with a white blood cells count of less than 1500 cells/mm3. For these patients not only are the chances of implant failure going to be higher, but the probability of the actual surgical procedure going wrong is also increased and could cause a life-threatening event [8].

This is subsequently followed by relative contraindications. These medical conditions can include diabetes, bone alterations such as osteoporosis and arthritis, cardiovascular diseases, blood disorders and autoimmune disorders. With relative contraindications the success rate is slightly reduced compared to a normal healthy individual. However, the implants can still be performed on these patients if proper diligence is followed before, during and after the treatment. Starting with the dentist and the relevant follow up after care by the patient and oral hygienist. After a proper medical examination, other diagnostic tests are undertaken [5, 8].

### 1.4 The diagnosis in dental implants

The diagnostic tests help us fully view the area where the implants are placed and all anatomical structures surrounding it, thus this helps to reduce the chances for complications. The diagnostic tools which are used are a mix of conventional radiography already in use (periapical radiographs) and other techniques such as cephalometric analysis that can be used to see the angles in the mouth which helps the dentist decide inclination of the implants. Furthermore, there is an increase in the use of the cone-beam computed tomography (CBCT), as it allows for a 2D panoramic image and also a 3D model which can aid in visualizing and understanding the surrounding anatomical structures in a greater level of detail. In addition, it is also useful in identifying other dental and osseous pathologies that are usually hard to diagnose with the naked eye. Because it is used in conjunction with powerful computer applications it allows the dentist to capture a picture from the axial and sagittal cross sections from a full panoramic, all these diagnostic tools further increase the success rate of the implants. Moreover, the diagnostic imaging can be used in conjunction with conventional

CAD/CAM systems; this means the dental laboratory will be able to see more accurate models and images which will increase the likelihood of them making a improved, more accurate implant restoration (9).

**1.5 The treatment in dental implants**

The technique to place an implant can differ depending on the dentist but there are three main surgical techniques. Firstly, there is the 2-stage implant placement. As the name implies, this procedure starts by putting the implant into the space within the oral cavity, then the bone and mucosa is left to heal around a healing abutment for 3-6 months before applying the permanent restoration. Secondly, the 1 stage implant placement. The Implant (part in the bone) and the supra-gingival part (the abutment which the final prosthesis rests) are applied at the same time and once the healing is done the supra gingival part is replaced with the real restoration. Lastly, the Immediate loading technique can be used where the abutment part and the final restoration are both fitted simultaneously in the same appointment. Even though the surgical techniques are different amongst all three the preparations undertaken for all are similar and especially important (5).

**1.6 Success in dental implants**

Regarding the healing and success rate of the implants, not only does the material that is being used have an effect, but so do other physical characteristics. These include different thread sizes on the implant abutment which can allow a stronger anchorage, the level macro porosity which changes the autologous bone graft's ability to adhere to the dental implant and even the shape (length and diameter) of the implant (10). This shows the industry is constantly growing, evolving, and adapting by trying new designs and materials to improve the survival rate and longevity of a dental implant by trying to replicate a real tooth. Currently, the survival rate over a 5-year period for a dental implant is between 92-95 % dependent on the type of reconstruction that is applied to the dental implant (11). This may seem quite impressive but also implies that on average 1 out of 14 dental implants fail. At present the survival rate for natural dentition with non-inflamed gingiva is much higher over the 5-year period, proving that natural dentition is still the gold standard. Moreover, there are no concrete studies for the survival of implants over a longer duration (11).

Regarding the type of implant, it is observed that the survival of a dental implant as a fixed implant prosthesis has a 95% survival rate, whereas a removable prosthetic implant only has a survival rate of 92 %. Therefore, the bone level and quality might be one of the biggest parameters for survival

(11). This may seem insignificant but when analyzed out of samples of 100 patients, the removable prosthetic implants have 3 extra patients which have had implants fail. However, the bone quality is not the only factor that affects the implant survival rate as there are countless variables (5).

**1.7 Complications in dental implants**

It should be considered that no matter how many precautions are taken before starting the treatment the placing of an implant is still a surgical procedure that can have complications during the surgery and there could also be complications post-surgery. Essentially the type of complications can be grouped into 3 categories. However, in real life the implant does not fail only because of one of these factors but it is usually a combination of them all. By categorizing these factors, it can help us understand them easily. There can be biological complications, technical complications, and aesthetic complications. Even though a large advancement has been witnessed in implant design the number of complications found has decreased slightly but are still high (11).

When discussing biological complications, this can be further sub-categorised into complications during the treatment and post treatment. Complications that can arise during the surgical procedure which can include errors when making the incision causing poor flaps to be made. Another complication can occur through incorrect placement of the implant in the right area of the bone or placing it at a wrong angulation which will increase implant failure. Finally, nerves and blood vessels might be cut or compressed during implant placement which can cause the patient to bleed out or cause facial paralysis (5). Post treatment complications can still occur if the patient does not follow post treatment guidelines. If the patient drinks and smokes the osteoblast function will be decreased which will negatively affect the rate of gum and bone healing. If the patient does not adhere to healthy nutritional guidelines and does not follow the proper post treatment cleaning routine with Chlorhexidine that will allow marginal infiltration of harmful bacteria, all of these factors will cause a decrease in implant survival rate (11,13,14).

Technical complications on the other hand are closely linked to the implant structure as a whole. If the patient is not used to the shape of the prosthesis or it has been poorly manufactured this can lead to disorders such as bruxism which can cause fractures or chipping of the ceramic material. During placement, the whole framework might fracture if the wrong angulation is chosen or if the wrong type of implant is chosen for the level of bone density and quality. Fracturing of the whole implant is one of the complications that is both biological and technical. It can lead to loss of retention, but the retention might fail due to technical reasons i.e length and width of the implant

were not correct, or it can be due to the bone graft material not properly integrating with all the surrounding structures. Finally, aesthetic complications are how negatively the patient sees the final product. They may not be impressed with the colour choice, the final shape of the prosthesis or the way the papilla and gingiva look after wound healing. Also, due to poor planning the patient may be unhappy with the facial height which has been achieved with the final prosthesis and the amount of facial mucosa recession [11,13,14].

Planning is a crucial part of any medical procedure. All the steps taken before, during and after help increase the rate of implant survival. As a medical practitioner a variety of precautions need to be taken, including making sure medical questionnaires are up to date along with all diagnostic images, liaising with the patients doctors to see medical health, sterilizing all instruments during the treatment and providing thorough patient aftercare. Even after taking all these safety measures, complications can still happen for a multitude of reasons. Additionally, in today's society there is a vast amount of information available to all which allows patients to achieve a vague understanding of dentistry and implantation. This acquired vague knowledge by the patient leads to the "Dunning-Kruger Effect", a phenomenon where people learn a few things on a certain topic which leads them to believe that they are an expert in the field and overestimate their own level of expertise. Considering this, some patients tend to think they know more than the dentist. This incomplete and misguided knowledge might lead them to make crucial mistakes they are not able to recognise [15].

### 1.8 Professional liability in dental implants

Referring to the introduction, Miguel Cervantes assumes a tooth to be more valuable than a diamond [4], therefore, the professionals working with those valuable teeth endure a significant amount of responsibility, including accountability for the arousal of complications during or after treatments. With this in mind, it is imperative for dentists to have dental cover and insurance to avoid liability.

But what can be considered as Dental liability and Malpractice? As described by the Oxford English Dictionary, Liability itself is defined as *'the state of being legally responsible for something'* and Malpractice being defined as *'careless, wrong, or illegal behavior while in a professional job* [16].' This can then lead to the requirement of compensation in the form of payment to the patient either by direct money settlement or by undertaking the dental treatment again at the cost of the dental professional. The increase of legal malpractice settlements is not isolated to the dental field. Other medical sectors have also identified an increase in settlement claims through legal channels. This is

not to suggest that medical practitioners are becoming more incompetent in their profession, but it highlights that there has been a significant shift in cultural awareness and we have transitioned into a rights based society [17]. As McCall Smith and Merry state, *'In general, however blameless the doctor, the patient is even less to blame for the injury'* [18].

The true extent of liability a dentist undertaking treatments on patients will differ dependent on the country of practice, the circumstance of the maltreatment and the scope of the indemnity cover which has been taken out by the dentist. The latter mentioned depends on the country or even the region the treatment was performed in. The National Practitioner Data Bank (NPDB) collected data between 2010 and 2021 which proved that 11.5% of the medical malpractices during this time period were a result of errors made by dental practitioners, whilst in Japan in 2018 of 857 medical malpractice lawsuits 12.8 % of cases were due to negligence by a dental practitioner. This further highlights the importance of professional liability insurance in the field of dentistry as malpractice suits can happen for any dentist anywhere in the world [19,20].

### 1.9 Justification

Within surgery, implants are one of the most frequent treatments in the field of dentistry. Considering that there is an increasing tendency in the demand, it is important to analyse the demands related to implants [21].

## 2. OBJETIVES

The objectives of this work is to evaluate the second instance judgments on professional liability related to dental implants in the Spanish Supreme Court. The concrete objectives we decided to look are the following:

1. To evaluate the second instance judgments on professional liability related to dental implants according to the sex of the plaintiff.
2. To observe the second instance judgments on professional liability related to dental implants according to the city.
3. To evaluate the second instance judgments on professional liability related to dental implants considering the type of clinic.
4. To describe the second instance judgments on professional liability related to dental implants considering the type of error.
5. To analyse the second instance judgments on professional liability related to dental implants ruling, as well as the existence of economic compensation.

The null hypothesis was that there would be no differences between sentences in relation to sex, city, type of clinic, type of error and sentencing.

## 3. MATERIALS AND METHODS

This work has been approved by the Preclinical Department of the European University of Madrid (**OD.029/2223**). The retrospective study was conducted between January 2023 and March 2023. To carry out the study, Spanish second instance judgments were selected that analysed the professional liability of dentists in surgery and implants in civil law from years 2020 to 2022 inclusive. Judgements that assessed aspects related to non-payment of previous judgements were excluded.

The data which collected from the **Aranzadi Institutions (Thomson Reuters)** via two avenues. The search was carried out through jurisprudence via two aspects. The first route the search was carried out using the words '**medicos y profesionales sanitarios > responsabilidad**. The second route was carried out using the advanced search option using the text **'odontológico'**.

The data was stored in an Excel spreadsheet using the following methodology: (i) first instance year; (ii) gender (male/female); (iii) dental practice type (private clinic practice/big company/insurance company); (iv) city; (iv) second instance year; (v) error type (diagnosis/treatment); (vi) area of expertise (implant/implant-prothesis); (vii) hospitalization (yes/no); (viii) request of financial compensation (yes/no); (ix) ruling; (economical compensation). For the qualitative data, a description of the results was carried out using percentages. For the quantitative data (financial compensation), a description was carried out using percentages, averages, and minimum and maximum values.

## 4. RESULTS

17 second instance sentences were included in the study according to the inclusion and exclusion criteria previously described. 12 sentences were for the year 2020, 3 for the year 2021 and 2 for the year 2022.

The first criteria which was analysed was that of the gender of the claimants.. From the 17 sentences, 12 were females (70.6%) and 5 were males (29.4%).

Regarding, the type of company the patients went through to receive the treatment the most frequent type of clinic was the private clinic (8/17; 47%) along with large companies (8/17; 47%). Only one sentence corresponded to an insurance company (1/17; 5.8%) ***(Figure 1)***.

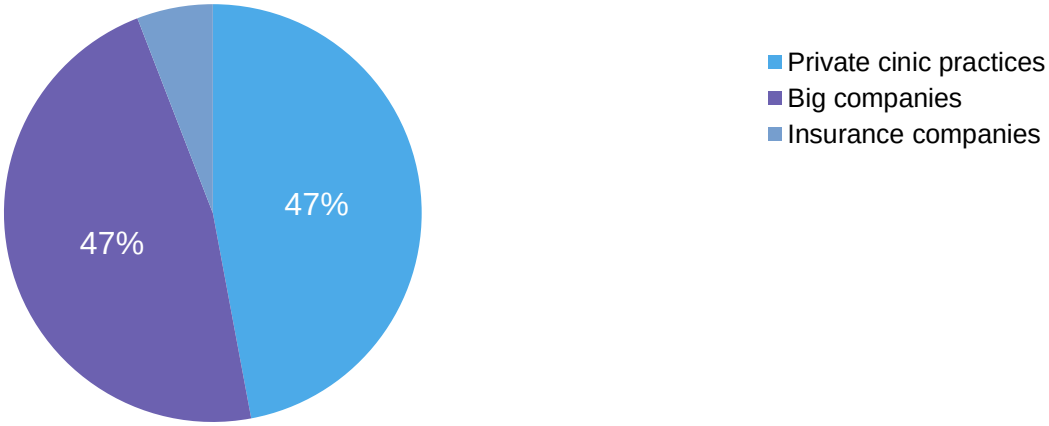



Figure 1. Percentages of people that went to each type of practice.

The next result that was described were the cities that these claims took place in. Most of the claims were from one city (10/17; 58.8%). However out of the 17 claims being researched, only3 out of the data pool took place in Madrid (17.6%) and 2 in Valencia (11.7%).

The next variable to examine is what type of error has occurred ***(Figure 2)***. 7/17 (41.2%) of the sentences analysed errors during the treatment stage, 6/17 (35.3%) of the analysed errors were during the diagnostic stage, and 4/17 (23.5%) sentences evaluated error in both phases of treatment. When observing the genders regarding the type of error, most of the sentences related to 'error during the treatment' were from females (6/7) this was also similar when looking at the judgements concerning the diagnosis (6/7|). However, majority of the judgments analysed showed both errors in diagnosis and treatment were males (3/4).

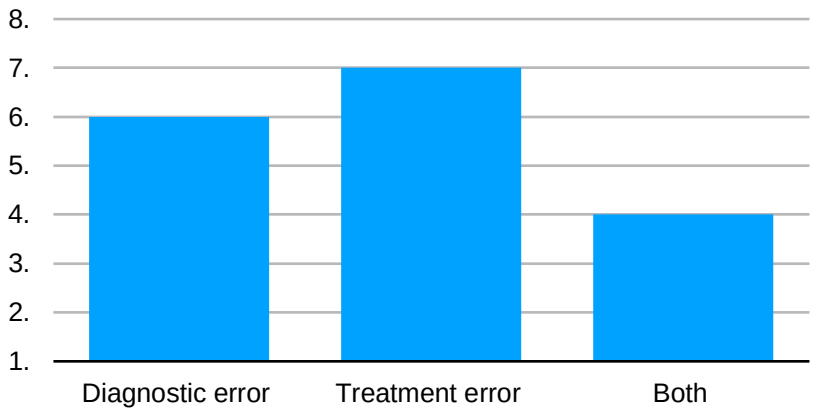



Figure 2 the type of error that led to legal action

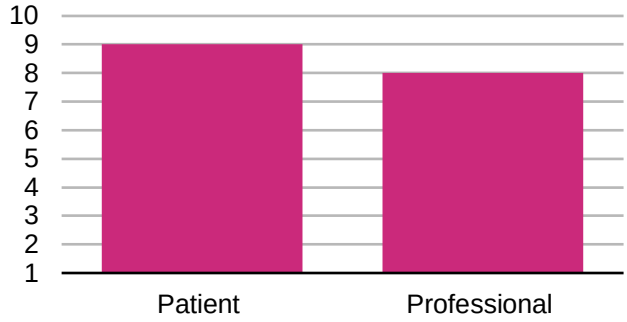
The following issues analyzed were the specialty in which the error occurred. Out of the cases which were overviewed for this study, 14 out of the 17 cases had a problem with the implant (82.3%) whilst 3/17 were errors in the implant prostheses field (17.6%). When observing the gender regarding the field of expertise, most of the sentences related to implants were from females (9/14) and all the sentences regarding in the implant prostheses were females (3/3).

When analyzing the need for hospitalization this was only to be true for 2 out of 17 cases (11.7%). In relation to gender, in one sentence it was a woman (1/2; 50%) and in another case a man (1/2; 50%). In regard to the type of error; one sentence was due to treatment error and the other was

caused by a diagnostic and treatment error. Regarding the type of clinic, one was in a private clinic (1/2; 50%) and the other in a big company (1/2; 50%).

In all circumstances; 100% of all cases (17/17), the claimants requested to be financially compensated to some degree for the issues they faced. Furthermore,8/17 (47.1%) sentences ruled in favor of the dentist and in 9/17 claims (52.9%) ruled in favor of the patient ***(Figure 3).***

Figure 3 The courts ruing in favour of the dentist or patient




As mentioned previously, In all these cases the patient received some form of financial compensation. From the 9 sentences that ruled in favor of the patients, the largest sum awarded to the plaintiff was 160,219.44 euros and the lowest was 600 euros. Between all 9 cases the total payout was 264,829.63 euros. Thus, the average pay out for each patient was 2,9425.51 euros. In relation to judgements in favor of patients 4/9 were analyzed for treatment error, 1/9 for diagnostic error and 4/9 for both types of error ***(Figure 4)***. 2/9 needed hospitalizing. In relation to gender and

sentences that received financial compensation, 3/9 (33.3%) were men and 6/9 (66.7%) were women.

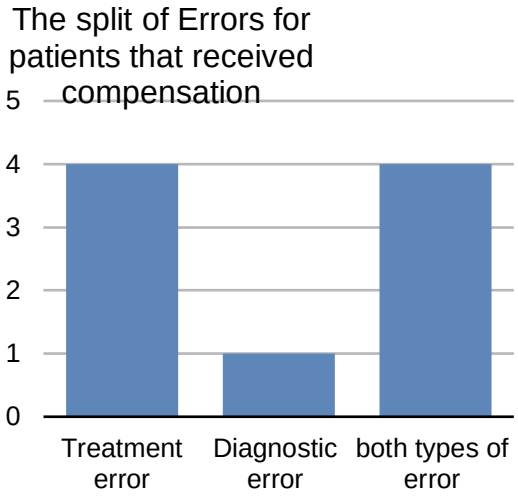



Figure 4 : For patients that received financial compensation

## 5. DISCUSSION

For this study 17 second instance sentences were analysed. Considering the inclusion and exclusion criteria.

Regarding the gender of the plaintiffs, from the 17 sentences, 12 were females (70.6%) and 5 were males (29.4%). This illustrates a higher ratio of women went to court. The question which arises is; Do women file more lawsuits than men? This depends on the context in which the term is being used. According to some studies (22) , women may be more likely to file medical malpractice lawsuits than men. This may be because women are more likely to seek medical care, and as a result, may be more likely to experience medical errors or malpractice this proves why in our sample size there was a greater proportion of women to men. Overall, it is important to note that any differences in the number or types of lawsuits filed by men and women may be influenced by a variety of factors, including social, cultural, and economic factors, and may vary depending on the specific jurisdiction and context as men might file more lawsuits in other areas such as improper dismissals or discrimination (22).

However, it is imperative to highlight that this may not necessarily mean that women are more likely to win medical malpractice cases or receive larger settlements. The outcome of a medical malpractice case depends on a variety of factors, including the strength of the evidence, the quality of legal representation, and the particular jurisdiction in which the case is filed (23)

Regarding the type of clinic complaint, majority were filed against private clinics (8/17; 47%). A private dental clinic is a dental practice which is owned and operated by one or more dentists or dental groups and operate independently to government or subsidised programs. Private dental clinics typically offer a wide selection of services, from routine cleanings and check-ups to more complex procedures such as fillings, extractions, and surgical dentistry (24).

Large companies have the same percentage of claims as private clinics in the same period between 2020 and 2022 (8/17; 47%). Large Companies follow the same system as private clinic however its owned by a dental group that franchises the practice. Dental clinics belonging to insurance companies were the least demanded group (1/17; 5.8%). Dental insurance companies work by providing coverage for a portion of the cost of dental care. Patients pay a monthly premium to the

insurance company, which then pays for a portion of their dental expenses when they receive treatment. The specifics of how dental insurance companies work can vary depending on the plans offered and the plans which the patient decides to choose in best suited to their dental needs. Some plans may require patients to choose from a list of dentists approved by the company, whilst others may allow patients to visit any licensed dentist as long as a medical receipt is issued for the insurance company as evidence. The list of treatments available to the patient can vary depending on the insurance plan, with some plans covering only basic preventive care like cleanings and check-ups. Whilst other plans may cover more extensive procedures like root canal treatments, orthodontics, and surgical treatments (25).

However, depending on the country, most people access dentists privately or through insurance companies. In some countries, such as the United States, a large proportion of people access dental services through private insurance plans (26). Although, in other countries with universal healthcare systems, such as Canada or the United Kingdom, most dental care is provided through the public healthcare system (27). In general, people who have dental insurance are more likely to access dental services privately, as insurance plans normally cover a portion of the cost of dental care provided by private dentists. On the other hand, those who do not have insurance or have limited coverage may be more likely to seek dental services through public clinics or community health centres (26,27). In our research we have no cases that occurred in public dental practices this is most likely due to public dental practices are not able to offer very complex treatments like a private clinic. It can also be noted that patients who seek treatment in the public clinics are more often than not unable to afford to proceed with legal action if there is an instance of treatment which has been carried out by the practitioner is unsuccessful. (22,23).

It is also worth noting that some people may choose to pay for dental services out of their own pocket, rather than going through insurance or public healthcare systems. This may due to various factors which could include; being seen by a preferred clinician, control over treatment options and not being tied into an insurance plan. In Spain, majority people access dental care through private dental clinics rather using insurance companies. According to a study published in the Journal of Health Economics in 2017, the majority of dental visits in Spain are financed through private payment rather than insurance coverage. The study found that approximately 70% of dental visits were paid in full by the patient, whilst only 30% of the population paid for treatments through

insurance [28]. Therefore, it appears that in Spain, more people access dentists privately rather than through insurance companies. Which correlates to the trend of our results.

With regards to the cities in which the legal proceedings took place, most of the claims were from one city (10/17; 58.8%). However, From the data of the 17 claims being researched, 3 out of the 17 took place in Madrid (17.6%) and 2 out of the 17 in Valencia (11.7%). According to the world population review, Madrid and Valencia are number 1 and number 3 most popular cities in Spain as of 2023 [29] respectively, thus experiencing a higher volume of cases due to increased population. However, Barcelona is the second most popular city which only saw one case within this study.[29]. A larger sample size would be necessary to know if there is a significant relationship between a location and the number of claims. In addition, it should be noted that this study analyses some second instance judgements, therefore it is not possible to determine whether a city is more likely to have malpractice judgements as all first instance judgements would have to be analysed. All the cities are subject to the national laws governing medical malpractice, there may be some differences in how these laws are interpreted by the court and how the court enforces this. However, it's important to note that medical malpractice laws in Spain are established at the national level therefore there is a recognised legal framework for medical malpractice throughout the country [30]. One potential difference between these cities could be the availability of legal resources, such as lawyers and law firms that specialise in medical malpractice cases. Barcelona is known for having a larger concentration of law firms that specialise in medical malpractice litigation compared to Madrid. This may impact how medical malpractice cases are reviewed and resolved in the city. This might be an indication of why Barcelona had a low number of cases as due to the superiority of the law firms maybe these cases were settled out of court [31].

Another potential difference could be the cultural attitudes towards healthcare and medical malpractice. There may be a stronger emphasis on the importance of healthcare in some cities and a higher level of trust in healthcare.

However, it's important to note that any differences between Madrid and Barcelona in terms of medical malpractice law is likely to be relatively minuscule as both cities are following the same national legal framework of the country, Spain. [30,31]

Diagnostic errors and treatment errors are two different types of errors that can occur in dentistry, just as they can in other areas of healthcare. Diagnostic errors in dentistry refer to situations where a dentist fails to correctly diagnose a dental problem or pathology. For example, a dentist may fail to recognize the signs of a dental infection may not notice the area of radiolucency and not accurately calculating bone quality these along with many other diagnostic errors can lead to delayed or inadequate treatment. Diagnostic errors can result in significant complications to the patient, such as infection and pain and in the worst cases loss of dentition [32,33,34,35].

Treatment errors on the other hand, occur when a dentist provides treatment that is inappropriate or incorrect for a patient's dental condition. A few Examples of treatment errors in dentistry include performing the wrong procedure, using improper techniques, or administering the wrong medication. Treatment errors can also result in harm to the patient, such as pain, infection, (Peri-implantitis), tooth loss and even hospitalization [32,33,34,36].

Both diagnostic and treatment errors can have serious consequences for patients, and it is important for dentists to take steps to prevent these types of errors from occurring. This may include being familiar with the latest dental research and best practices, using proper techniques and equipment, and being mindful of the unique needs of each patient [32,33,34].

It is also important for patients to communicate openly with their dentists about any dental concerns or symptoms they may be experiencing, as this can help to ensure that accurate diagnoses are made and appropriate treatments are provided [32,33,34].

According to research done in Tehran; From 107 lawsuit filed confirmed by the Special Committee of Dental Specialists from 2014 to 2019 in the three large dental clinics in Tehran. 88 cases were related to treatment errors (82.2%), and 19 cases were related to diagnostic errors (17.7%) [34]. This does not link directly to the results observed on this study as 7/17 (41.2%) of the sentences analysed errors during the treatment stage, 6/17 (35.3%) of the analysed errors during the diagnostic stage. The results shows that the errors are just as common as each other. It is important to remember that the cases we reviewed don't list if the failure in treatment is due to a failure in the diagnostic stage or if it is independent.

Evaluating the origin of the error, whether it is due to the implant, or the implant-supported prosthesis is very important.

Out of the 17 cases 14/17 cases had a problem with the implant (82.3%) while 3/17 where errors in the implant prostheses field (17.6%). It is a very complicated area of dentistry, a meta-analysis that concluded that only 66.4% of the patients were free of any complications after 5 years [37,38] out of all the complications that could occur with an incidence rate of greater then 15 % we see that the problems were caused by loosening of the overdenture retentive mechanism (33%), resin veneer fracture with fixed partial dentures (22%), implant loss with maxillary overdentures (21%), overdentures needing to be relined (19%), implant loss in type IV bone (16%), and overdenture clip/attachment fracture (16%) [39]. From this we can see that the prothesis fails a lot but in the results of this work, prosthetic failures only account for 17.6 % of the failures. The fact is that if the prosthesis for a patient fails, it is easier to fix, as you can visually see the problems with your eyes and you can keep fixing it at the discretion of the dentist [40]. For example, If the prosthesis fails 3 times, then the dentist can tell the patient they will forgo the cost for the prosthesis but will still help rectify the problem without having to go to court. The problem with implant failure is the fact that it is a surgical matter [41]. To rectify the failure, It would require the dentist to perform this invasive surgery again. A patient would not feel confident with dentist to execute this treatment again knowing that the dentist failed to in the first instance to deliver a successful treatment. This ultimately leads the patient to seek medical advice and further proceed with litigation.

Most dental implant procedures are performed in normal dental clinics and do not require the use of a hospital. However, some patients due to factors such as disability can  makes them non-compliant for long periods of time under local anesthetic, therefore it is in the best interest of the patient to undertake a treatment such as implants under general anesthesia. This principle can also apply to the patients who suffer with dental anxiety and would benefit from general anesthesia.

In this instance when hospitalization is mentioned this is rather due to negative outcome of the failed treatment and having to be hospitalized is out of necessity over patient comfort. Hospitalization due to dental implant placement is a rare occurrence as is highlighted in the results. Only 2/17 (11.7%) of our cases caused hospitalization this may be higher than the normal value as this study is focusing on claimants who require compensation and going down this avenue, of hospitalization, only benefits the claimant's endeavor of a financial remedy due to failed treatment. looking at rare cases, hospitalization may be necessary if there have been complications during or after the implant placement procedure. These complications could include infection, nerve damage,

excessive bleeding, or implant failure [5]. In our case one patient was admitted to the ICU after a fracture of the internal Mandibular cortex which caused septicemia as the bacteria in the area spread to the blood stream.

Dental infection is the leading dental-related cause hospitalization of patients and is a cause that could be prevented. If an infection has occurred, we can alleviate it with drainage of the infection, The administration of antimicrobials, rehydration, nutrition and usage of mouthiness that contain Chlorhexidine are also for important the management of dental infection [43,44]. Quick and timely intervention of surgical complications in dental implant placement by the dentist can reduce the risk of dental complications. It is recommended to precisely identify the location and the etiology of infection in order to perform a better and more successful treatment [43]. The timely intervention can reduce the chances of hospitalization occurring and therefore decreasing the chances of a malpractice claim being filed against the clinician.

Finally, we looked at the amount of compensation which was determined over the cases. 6/9 (66.7%) cases were won by women which positively correlates to the trend as we had more women than men in our results. However, if we take into account the number of women that took their cases to court, only 6/12 women which equates to 50% won their cases. In comparison 3/5 (60%) of men won their cases. Is this statistically relevant or does the smaller data pool hinder the results. For gender discrepancies in lawsuits there was no concrete information due to their being different types of cases which have different gender biases. For example, when analysing custody cases women have a 90% success rate. [45]. Evaluating the average pay outs, the patients received 29,425.51 euros. However, there was one case in which the total compensation accounts for more than 60% of the total compensation earned from all the cases. This affects the distribution as it is heavily skewed to one end, with an unrepresentative outlier pulling the average in their direction leading to a statistical fallacy that is not representative of the sample [46]. If we look at compensation per gender the average earned by men equated to 7,723.69 euros and the average compensation earned by the women was 40,276.43 euros. So, women on average earned 30,000 euros more in compensation than the men in Spain. When taking into consideration the average cost per dental implant is 1,450 euros [47] this shows the average payout awarded to men would only be able to cover the cost of two dental implants. Looking at this objectively it shows that when taking into account legal costs and the cost of human time (waiting for court days and time spent within the court) the compensation does not accurately reflect what the patient has gone through. In Spain it

Is not mandatory to cover the legal costs of the winning party, this comes from the courts discretion, case dependent. Article 394.2 of the Spanish Civil Procedural Rules refers to this point when it says: "… each party will bear their own costs and half of the common ones, unless they are grounds to believe one of the parties have acted recklessly (48)." In this instance we were not privy to the information if the successful party were also reimbursed for their legal costs.

## 6.CONCLUSION

1) Women are twice as likely than men to file medical malpractice suits. And file for the legal compensation they deserve when an issue has been caused. Which enables them to file for legal compensation for the lack of duty of care from the treatments which they have undertaken.

2) The size of the city does not affect the appeal but statistically should not be given a high regard when looking into this matter. This is due to larger cities relatively having a higher number of cases due to population and claims. The only affect the type of city will have in your case will be the level of legal advice received as larger cities have bigger law firms which give the claimant a choice of high-level specialized attorneys.

3) People attend private clinics as often as they do large companies in Spain as there was an even statistical split. There was no evidence which highlighted a preference of which type of dental clinic was visited by either gender. Receiving dental care through insurance companies in Spain is not a common practice. However, even if errors occur in insurance companies, there is likely to be a better claim system which enables cases to be settled outside of court due to the time-consuming nature and legal costs of court cases.

4) Diagnostic errors and treatment errors both occur as much as each other. An error in either one will normally lead to a problem in the patient. Usually, if you have a diagnostic error, you will have an error in your treatment plan as they both coincide. But a problem in the diagnostic stage or the treatment stage will affect your probability of not only short-term success but long-term success. Both errors have the same success rate in court.

5) Regarding the failure of implants and the implant prosthesis, we can conclude that errors can occur in both stages. However, the errors caused by the actual implants usually leads to more complicated issues due to the invasive nature. A lot of time goes into planning of an implant treatment. So, when a situation arises of a complication with the implant placement this needs to be treated as a serious matter. the implant placement so if a situation arises it is already towards the more dangerous side. Implant prosthesis also fail but as they can be constantly fixed and restored outside the oral cavity and with no surgical treatment needed on the patient, they

will be less inclined to seek medical compensation as any failures can be accurately corrected without causing more distress to the patient.

6) If hospitalization occurs, there has been a great error in the treatment as there is no need to receive dental care in a hospital unless there are previous underlying conditions (ASA classifications of 3 and 4 and Mental Disabilities). If hospitalization occurs due to a consequence of your dental treatment then you are most likely to win your case as is shown in our results when both people were hospitalized they successfully won compensation. There is no conclusive evidence for if women are hospitalized more than men or vice versa.

7) In our results we can't say women won more cases than the men as both probabilities were quite even given the small sample size. However, we concluded that women win on average 30,000 euros more than men. Our results did contain a statistical outlier and if we remove that from our results the women still won compensation on average of 8500 euros more than the men.

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