

Electrosurgical procedures: survey of procedural records of adverse events in the State of São Paulo

Procedimientos electroquirúrgicos: relevamiento de registros procesales de eventos adversos en el Estado de São Paulo

Procedimentos eletrocirúrgicos: levantamento de registros processuais de eventos adversos no Estado de São Paulo

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Submission: 08-06-2020**Approval:** 08-20-2020**Abstract**

The present study aimed to identify the main generators of adverse events and the regions of greatest occurrence. The study was developed based on a survey on the website of the Court of Justice of São Paulo, in which we found 101 cases in the judgment phase (final phase legal opinion), involving accidents during electrosurgical procedures performed in the State of São Paulo, in the period of 2008 to 2018. The results allowed to identify the main generators, according to the reports in the processes, 43% related to the use of the electric scalpel, 21% with the electrosurgical plate. Regarding the location of the burns, 73% lower limbs, sacral region, calcaneus, and ankle. Considering that because they are, in most cases, avoidable situations, one should invest in permanent education for the surgical and nursing staff.

Descriptors: Electrosurgery; Adverse Effects; Nursing; Medicine; Tendencias.

Resumen

El presente estudio tuvo como objetivo identificar los principales generadores de eventos adversos y las regiones de mayor ocurrencia. El estudio se desarrolló a partir de una encuesta en el sitio web del Tribunal de Justicia de São Paulo, en la que se encontraron 101 casos en la fase de sentencia (dictamen judicial en fase final), relacionados con accidentes durante procedimientos electroquirúrgicos realizados en el Estado de São Paulo, en el período de 2008. al 2018. Los resultados permitieron identificar los principales generadores, según los reportes en los procesos, 43% relacionados con el uso del bisturí eléctrico, 21% con la placa electroquirúrgica. En cuanto a la localización de las quemaduras, 73% miembros inferiores, región sacra, calcáneo y tobillo. Considerando que por ser, en la mayoría de los casos, situaciones evitables, se debe invertir en la educación permanente del personal quirúrgico y de enfermería.

Descritores: Electrocirugía; Efectos Adversos; Enfermería; Medicamento; Tendencias.

Resumo

O presente estudo objetivou identificar os principais geradores dos eventos adversos e as regiões de maior ocorrência. O estudo foi desenvolvido com base em levantamento no site do Tribunal de Justiça de São Paulo, no qual encontramos 101 processos em fase de acórdão (fase final parecer jurídico), envolvendo acidentes durante procedimentos eletrocirúrgicos realizados no Estado de São Paulo, no período de 2008 a 2018. Os resultados permitiram identificar os principais geradores, de acordo com os relatos nos processos, 43% relacionado ao uso do bisturi elétrico, 21% com a placa eletrocirúrgica. Com relação ao local das queimaduras 73% membros inferiores, região sacral, calcâneo e tornozelo. Considerando-se que por serem, na maioria das vezes, situações evitáveis, deve-se investir na educação permanente para equipe cirúrgica e de enfermagem.

Descritores: Eletrocirurgia; Efeitos Adversos; Enfermagem; Medicina; Tendências.



Introduction

In health institutions, the incorporation of new technologies, especially in surgical procedures in recent years, has demanded a growing concern for patient safety from doctors and nurses. The widespread use of these resources also meant that a complexity of risk-generating equipment was introduced in hospitals¹.

Despite the countless benefits brought using these technologies, there is also the possibility of errors during procedures and the incorrect use of the generating unit and its accessories.

It is important to mention the error definition: "Operation error is the main source of risk for hospitals using biomedical equipment"². In a Brazilian study by the Oswaldo Cruz Foundation which analyzed three hospitals located in Rio de Janeiro, which showed that eight out of every 100 inpatients suffered one or more adverse events, 67% of which could be avoided.

In this sense, the present investigation has study questions: What are the main generators of adverse events mentioned in procedural records? Which regions have the highest occurrence of these adverse events? What is the greatest need to minimize adverse events in electrosurgical procedures?

The objective was to identify, in official documents of the Court of Justice of the State of São Paulo, which are the generators of adverse events caused during electrosurgical procedures and mentioned in procedural records.

Methodology

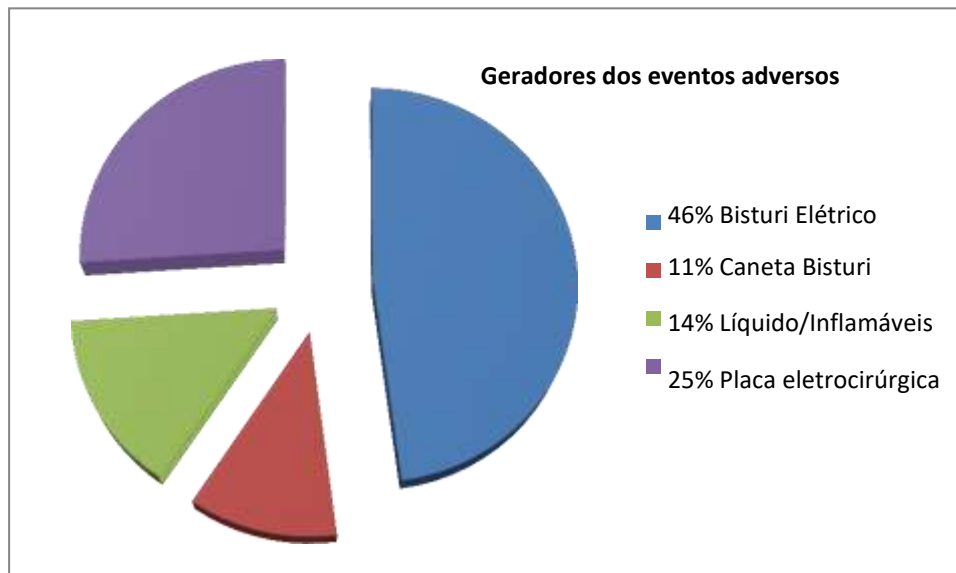
Data were collected by searching the website of the Court of Justice of the State of São Paulo (<http://www.tjsp.jus.br/>)⁴ on November 8, 2018, at 04:04 pm, 101 cases were found in the judgment phase (final phase legal opinion), in the period between 2008 and 2018, involving hospitals in the State of São Paulo. In these cases, the appeals were ruled between the parties, partially granting the plaintiff's appeals, or having the appeal dismissed.

The documentary analysis was carried out by means of systematic and objective procedures to describe the messages of the content, allowing the survey of adverse events and their main causes. This analysis was carried out in three phases: Pre-analysis - organization of the material and systematization of ideas; Analysis organization - definition of categories and preparation of spreadsheets. Statistical treatment - quantitative statistical analysis, in numerical and percentage form, the data were entered in figures for better visualization and understanding.

Results and Discussion

After analyzing the 101 processes in the wake-up phase, the main generators of adverse events were identified, which can be analyzed as to their function and respective concepts, which were launched in figures for better visualization and understanding, placed below.

Figure 1. Main factors that generate adverse events identified in the processes. São Paulo, SP, Brazil, 2018



Source: São Paulo Court of Justice⁴.

Among the main generators of the adverse events that led to the opening of proceedings, the electric scalpel was found to be the most representative, 46%. Study² reports that to ensure the maximum performance of the equipment with the minimization of risks, it implies

attention in three factors: equipment in adequate operating conditions; installations compatible with the needs of the equipment, designed and executed, in accordance with current legislation and standardization; medical, nursing and technical support teams trained in



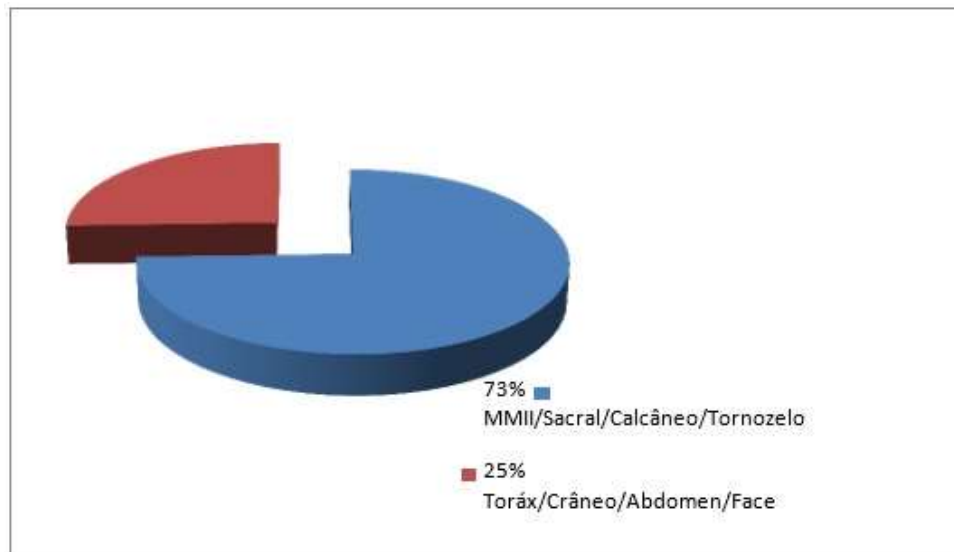
the use and maintenance of these technologies.

Then, we can mention another adverse event generator, according to the reports, in the analyzed processes, with 25% the electrosurgical plate. The Electrosurgical Plate, also called return electrode, neutral electrode, dispersive electrode, and plate electrode. Provides a return path for the high frequency current, with a current density in the biological tissue sufficiently low, to avoid undesirable physical effects⁵.

Regarding to accessories, NBR / IEC No. 60.601-2-2: 2017 recommends the following measures: user should regularly inspect the accessories - in particular, warns that

the electrode cables and accessories for use in procedures are inspected to verify the possibility of damage to its insulation -; the connectors of the active and return electrodes must not be interchangeable; for accessories marked as being disposable, sterilization requirements are not required. And it also suggests minimizing the distance between the operating field and the electrode reduces the load resistance. For a given power at the location of the active electrode, the required output power of the electrosurgery generating unit is reduced, as well as the high frequency voltage through the patient, consequently, the risk of unwanted burns is less⁵.

Figure 2. Regions with the highest occurrence of injuries caused by the surgical procedures identified in the processes. São Paulo, SP, Brazil, 2018



Source: São Paulo Court of Justice⁴.

Another important aspect to be highlighted refers to the regions with the highest occurrence of injuries mentioned in the analyzed processes. They occurred 73% in lower limbs and more frequently in the following regions: thigh, heel, foot, right leg, left leg and knee. Regarding the criteria for choosing the best region to apply the return electrode (plate), according to the Association of periOperative Registered Nurses (AORN)⁶, we must consider the following characteristics: a region rich in muscle mass, clean and dry, without hair, furthest from bony prominences, as close as possible to the surgical incision. Minimizing the distance between the surgical incision and the electrode reduces the load resistance. For a given power at the location of the active electrode, the required output power of the electrosurgery generating unit is reduced, as well as the high frequency voltage across the patient, consequently the risk of unwanted burns is less⁵.

In 25% of the cases, it occurred in the upper limbs, with injuries to the chest, shoulder, face, and skull standing out. Again, the determination of ABNT is worthwhile in order to prioritize the patient's anterior

part for applying the plate / electrode; in order to avoid the patient's contact with the metallic parts connected to the ground or present an appreciable capacitance in relation to the ground. Antistatic cabinets are recommended in these cases⁵.

Final Considerations

In the survey of the data presented, it was found that 43% of the processes blame the electric scalpel as the generator of adverse events. We must highlight some points that were reported in the processes, which can contribute to the appearance of the burn:

- Contact of bone prominence with metal parts, facilitating burn in the calcaneus region.

The patient must not meet metal parts that are grounded or have an appreciable capacitance to the ground (for example, operating table support, etc)⁵.

- Fluid (asepsis) under patient, facilitating burn in the sacral region.

Any type of liquid under the patient or in contact with him, should be avoided, for example, by inserting a dry compress, as this liquid can cause burns by diversion of electric current to the place of contact with this liquid⁵.

- Extravasation of liquids through probes and or drains.
- Exposure of the scalpel pen to flammable gases, in plastic and ophthalmologic surgeries, leading to burns of the face and neck.

The use of flammable anesthetics or oxidizing gases, such as nitrous oxide and oxygen, should be avoided if a surgical procedure is conducted in the chest or head region, unless these agents are sucked in⁵.

Incorrect handling of the scalpel pen (heated after use) leaving it without protection, on top of the patient.

Active electrodes temporarily out of use should be stored in a location that is isolated from the patient⁵.

- Placing the cardiac monitoring electrode close to the surgical incision.

The electrodes for cardiac monitoring should be placed as far away from neutral as possible, with a minimum distance of 15 cm from the surgical incision. Needle-shaped monitoring electrodes are not recommended⁵.

According to a study², high frequency surgical equipment (electric scalpel) and accessories are accessible only to highly qualified and trained operators in restricted access areas.

As reported by the National Health Surveillance Agency (ANVISA)⁷, in the event of an accident, a qualified professional must be called in to diagnose the situation, to avoid the repetition of cases. In addition to issues related to the professional and patient safety, the financial impact of adverse events associated with electrosurgical procedures should not be overlooked, according to the processes evaluated: Indemnities with moral, material and aesthetic damages: around R\$ 4,137,200, 00, under the responsibility of the health institution.

Preventing these adverse events necessarily involves the adoption of system changes that reduce the probability of the adverse situations in question, above all, permanent education for the surgical and nursing staff.

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