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Response and legislative changes after the Kiss nightclub tragedy in Santa Maria/RS/Brazil: Learning from a large-scale burn disaster

Alfredo Gragnani [a,*], *Andrea Fernandes de Oliveira* [a], *Daniel Boro* [a], *Tam N. Pham* [b], *Lydia Masako Ferreira* [a]

[a] *Universidade Federal de São Paulo, Escola Paulista de Medicina, Brazil*
[b] *University of Washington Medicine, Harborview Medical Center, United States*

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ABSTRACT

Purpose: A major fire occurred on January 27, 2013, at 02:30 at Kiss nightclub in the city of Santa Maria, State of Rio Grande do Sul, in Southern Brazil. In this retrospective report, we aimed to describe the nightclub fire event, its immediate consequences, and evaluated its impact on legislation. Our objective was to disseminate the lessons we learned from this large-scale nightclub fire disaster.

Methods: We conducted a literature review in PubMed and Lilacs database from 2013 to 2015 related to the nightclub Kiss, Santa Maria, fire, burns, and similar events worldwide over the past 15 years. We searched in the general press and online media information sites, and seeking legislation about this topic at the federal level in Brazil. We reported on the legislation changes that resulted from this nightclub fire.

Results: Current federal legislation on fire prevention and the scope of public safety, including night clubs and discos, states is the duty of the state and everyone's responsibility, pursuant to Article 144 of the Federal Constitution of Brazil. Thus, the federal union, individual states and municipalities have the power to legislate on fire prevention, and especially to ensure the security of the population. A state law called "Law Kiss", was passed in 2014, establishing standards on safety, prevention and protection against fire in buildings and areas of fire risk in the state of Rio Grande do Sul. On a national level, a law of prevention and fire fighting in Brazil was also drafted after the Santa Maria disaster (Law project no. 4923, 2013). Currently, this bill is still awaiting sanction before it can take effect.

Conclusion: As we push for enactment of the national law of prevention and fire fighting in Brazil, we will continue emphasizing fire prevention, fire protection, fire fighting, means of escape and proper management. All similar events in this and other countries remind us that similar tragedies may occur anywhere, and that the analysis of facts, previous mistakes, during and after the incident are crucial to our understanding, and will help us lessen the chance of future occurrences.

* *Corresponding author at*: Rua Botucatu, 740-Protocolo, Vila Clementino, CEP 04023.062 São Paulo, SP, Brazil.
E-mail addresses: agragnanif@gmail.com, gragnani.dcir@epm.br (A. Gragnani).

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1. Introduction

A major fire occurred on January 27, 2013, at 02:30 at Kiss nightclub in the city of Santa Maria, State of Rio Grande do Sul, in Southern Brazil. Whereas the club had an area of 615 m^2 and a estimated capacity for 700 people, it was overcrowded with 1200–1300 people attending a musical show at the time of the tragedy. A total of 230 victims died on-site due asphyxiation, carbon monoxide and cyanide poisoning, while an additional 12 individuals died during hospitalization. Most of these victims were university students aged between 18 and 21 years of age [1]. By number of fatalities, the Santa Maria burn mass casualty incident (MCI) ranked as the fifth largest tragedy and the second largest fire incident in Brazil over the last 50 years. The largest burn MCI occurred in Niteroi in Rio de Janeiro in December 1961, during a show at the Gran Circus North American. This event accounted for 503 deaths, and was attributed to arson [2].

Following the Santa Maria burn MCI, Brazilian authorities have enacted major legislative changes to prevent similar large-scale disasters in the future. Specifically in the state of Rio Grande do Sul, where the fire occurred, a state law called "Law Kiss", was drafted after the incident, and was approved in December 2013 and signed into law in January 2014 [3]. In this retrospective report, we aimed to describe the nightclub fire event, its immediate aftermath, and evaluated its impact on legislation. Our objective was to disseminate the lessons we learned from this large-scale nightclub fire disaster.

2. Methods

We conducted a literature review in PubMed/Medline and Lilacs databases related to medical subject headings (MeSH) [results; inclusion data]: the Kiss nightclub [3;3], Santa Maria [104, they are authors' surnames;0], burn disaster [317;22], mass casualty incidents [549;9], legislation and law, from 2013 to 2015. We intersected our search between burn disaster and mass casualty incidents [123;7], burn disaster and legislation [26;0] and burn disaster and law [28;0]. We also searched similar events worldwide over the past 15 years in PubMed/Medline and in the general press and online media information sites, and seeking legislation about this topic at the local, regional and federal level in Brazil on official governmental websites. We reported on the legislation changes that resulted from this nightclub fire. Inclusion criteria were the presence of burn disaster, mass casualty incidents, Kiss nightclub, Santa Maria, legislation and law from the date of the Santa Maria disaster to the present. Exclusion criteria were other types of burn MCI, or incidents in which there was insufficient reporting on the circumstances of the event, the aftermath, and legislative changes.

3. Results

3.1. *Incident, emergency response and outcomes*

The fire started around 02:30 AM at the Kiss nightclub when the performing band attempted to use fireworks. The use of flares for pyrotechnic effects during the show was the immediate cause of the fire. Whereas flares are designed for use in open spaces, in this case a member of the band lit a flare and took aim at the ceiling. Flames then quickly engulfed the nightclub foam ceiling used for sound-proofing. The fire extinguisher did not work when one of the musicians tried to use it, and the flames spread rapidly with production of toxic and thick smoke which quickly occupied the enclosed space. People panicked, tried to leave in a disorganized manner, while others lost their sense of direction and ran to the bathrooms. Only one door served as entry and exit. Turnstiles were used to control payment, which blocked the evacuation route. The property also had no fire alarm or sprinkler system [1].

The Military Police was first on the scene, followed by the state fire department, and then the municipal Mobile Pre-hospital Assistance (SAMU) ambulances. The number of casualties was not communicated clearly to the various units arriving on scene, leading to insufficient rescue personnel and equipment. Incident command was established on scene, but the rescuers and police were still unable to control the chaos of multiple bystanders attempting to assist in the rescue efforts. The Municipal Sports Center (CDM) was designated as the location for dead bodies, where fatality identification and communication with families occurred, as well as forensic evaluation. A command center was established at the Hospital de Caridade Astrogildo de Azevedo (HCAA) in Santa Maria to direct patient flow, recruit staff, and procure additional supplies, as needed.

In addition to on-scene fatalities, approximately 300 injured people received care for injuries. Of these, 88 needed intensive treatment for severe inhalation injury and associated injuries. The victims suffered primarily from smoke inhalation and many underwent endotracheal intubation and mechanical ventilation. In Santa Maria, 27 patients were hospitalized in serious condition at the University Hospital, the Charity Hospital, the Health House and the Garrison Hospital. The direst shortage was of mechanical ventilators, with a need 10 times the normal available number. Equipment had to be borrowed from local hospitals, neighboring cities, and distant areas in other states. This request occurred almost immediately, but ventilators were shipped over hours and days from nearby hospitals and from others States in Brazil. In the meantime, priority for ventilator allocation was triaged using Sequential Organ Failure Assessment (SOFA) scoring.

The primary triage strategy was to evacuate the victims from the scene to the local hospitals as soon as possible because the incident involved inhalation injury. Few endotracheal intubations were performed on site. Approximately 2 h after the start of the fire, the rescue had been completed. Soon after the disaster, all of the local hospitals (7) were working beyond their full capacity, and a crisis management plan was established. The patients were classified as (1) mechanical ventilation and burns, (2) mechanical ventilation and no burns, (3) oxygen support and no/minimal burns, (4) skin burns only, in order to define care priorities. Within 24 h, 56 victims were transferred by air to referral center in the State's capital [4]. No patient died from insufficient number of mechanical ventilators.

The City of Santa Maria asked for help from health facilities in other municipalities (Fig. 1). These transfers were carried out by air transport. A total of 56 patients were transferred to Porto