Abstract

Introduction: The population has experienced an urban martyrdom in traffic due to the growing number of vehicles, which in many cases have not accompanied the development of their respective cities in the social and structural questions. With this, it became routine situations to encounter the Emergency Mobile Assistance Service (SAMU) addressing accident victims, in which some of them lose their lives on public roads in the face of the need to receive treatment for complications arising from the trauma mechanism in very short time.

Objective: The study evaluated nurses’ knowledge regarding the applicability of the tourniquet, from a risk and benefit perspective.

Method: It is an exploratory type research, with quantitative character and approach, it was performed with 30 (thirty) SAMU nurses, who were informed about the objectives of the same. They were included those who provided direct assistance to the population; Of effective positions or contracted in the service; And those with more than 1 year of service at SAMU. The instrument used for data collection was a questionnaire, previously elaborated, containing objective, subjective and non-inductive questions, which allowed the informant to answer the data pertinent to the study.

Results: The study highlighted the predominance of women among the nurses, aged between 31 and 35 years, specialists, with more...
Introduction
The adult human body contains on average 4 to 6 liters of blood. During severe external bleeding, the body may rapidly lose large amounts of volume, leaving the professional responsible for choosing the best course for stopping the bleeding. It is estimated that a healthy adult can lose 15% of the total volume of blood without suffering reactions, when exceeding that amount, the body begins to respond to this lack.

According to the Ministry of Health, in Brazil there are about 150,000 violent deaths per year. Homicides and traffic accidents accounted for 62.5% of all deaths from external causes in Brazil in the last decade. According to the most recent data from the Mortality Information System (SIM) of the Ministry of Health, 42.2 thousand of people died due to traffic accidents in 2013.

About nine billion of reals are destined for trauma care, almost one third of all that is invested in Public Health in the country [1]. Trauma is currently a serious problem, as it is responsible for a significant portion of emergency hospital care worldwide. Of the patients who are victims of closed trauma, 85% suffer from lesions of the musculoskeletal system, presenting several bleeds that can lead the individual to death [2].

Faced with one of the greatest problems not only in health but also in society, which causes problems and social and economic consequences for individuals, injuries are responsible for a large number of deaths, as they cause prolonged or even permanent disability. The time elapsed between the accident and hospital care is a decisive factor in reducing mortality and the occurrence of sequelae [3].

In the emergency medical service, the incidence of traumatic limb injuries is increasing, which can be accompanied by bone fractures and vascular lesions. These injuries, when they do not lead to death, often result in deficiencies and temporary or permanent physical incapacitation, which negatively interfere in the quality of life of the victims who survived the accidents [4].

As a method to contain hemorrhages is the tourniquet, usually used to staunch severe external bleeding, especially in limbs. Used as a last
resort, only when the other control methods fail, it can be replaced in most cases by a compressive dressing. If there is no bleeding control, if the bleeding is arterial or mainly of the limbs, the use of the tourniquet is undoubtedly the most valid action [5].

Despite all the threat that the use of the tourniquet causes to the limb, vessels, tissues, nerves and muscles, which do not support interruption of blood flow for more than six hours, thus causing irreversible lesions and necrosis of the site; Because the cells do not survive long time with the absence of oxygen, and in less than two minutes the organism feels and suffers with this interruption, the use of the tourniquet causes controversy for scholars and professionals in the area, so it is emphasized that it is an effective method with regard to "saving lives" [6].

The practice of applying the unnecessary tourniquet can be considered a serious problem in the health of the victim, being this responsibility of the acting nursing team. This information has been verified since the changes in the protocol of Initial Care to the Traumatized in the Pre-Hospital [7], which, the new update prompts that after the tourniquet is used, it should not be loosened, been necessary the register of the time it was applied.

In this perception, the professionals involved in the APH should be aware, when prioritizing the life of the victim. As a professional inserted in the Initial Care of the Traumatized, the nurse must be able to face situations that demand responsibility and knowledge. In order to evaluate the knowledge of emergent nurses on the subject, it is possible to generate a relevant conception for professionals and/or future professionals of the area, regarding the domain of information about the risks and benefits from the application of the tourniquet and when this should really be used. Based on this assumption, the following question was raised: what is the knowledge of prehospital care nurses about the actual indications of the tourniquet, as well as its benefits and complications?

The study seeks to deepen the subject addressed, serving as a source of information for academics, professionals and researchers, as well as the search for a method used to reduce or alleviate this health problem that is present in our environment: trauma. This information places great importance on the proper use of the tourniquet, emphasizing the reduction of costs that would be drastically greater if used in an erroneous way.

The study aimed to evaluate the knowledge of emergency nurses on the applicability of the tourniquet, as well as: describe the indications of the procedure; propose a precise conduit for the use of the tourniquet based on the updates provided by the PHTLS; and to assist the nurses in the process of their knowledge, regarding the benefits and complications of the tourniquet.

**Method**

This is an exploratory type study, with a quantitative approach. The research was carried out with emergency nurses from the Emergency Mobile Care Service (SAMU 192), located at Lima Campos Street, No Number, in the São Sebastião Neighborhood, in the municipality of Patos - PB, which houses Patos SAMU Regulation Center, Responsible for the municipality and seven (7) decentralized bases: SAMU Teixeira; São José do Bonfim; São José de Espinharas; Passagem; Santa Luzia; Condado and Santa Terezinha. The service has nine (9) vehicles: four (4) basic ambulances and two (2) advanced ambulances, as well as one (1) Quick Intervention Vehicle and one (1) National Force, used for the care of victims in remote places. It also has a motolance, which aims to reduce the waiting time of care of the victims. The ambulances are manned by care drivers, nursing technicians, doctors and nurses.

The population was composed of 35 (thirty-five) nurses from the Mobile Emergency Care Service.
(SAMU 192), and the sample comprised of 30 professionals (85.71% of the universe). Included in the research were nurses who work in the assistance of SAMU 192; Those of effective position in the service; And those with more than 1 year of service. Those that act in the administrative part of SAMU 192 were not included in the study; And those who are not tied to the service due to vacation, medical leave or maternity leave.

Although in the study, the participants were informed about the objectives of the same, and the confidentiality of the information provided at the time of the interview was compromised. After receiving all the information about the objectives of the research, the same ones to participate, signed the Term of Free and Informed Consent.

The instrument used for data collection was a questionnaire, previously elaborated, containing objective, subjective and non-inductive questions, that allowed the informant to answer the data pertinent to the study. The instrument presents sufficient data for the characterization of the sample, as well as questions aimed at the nurses' knowledge regarding the indications, benefits and complications of the tourniquet.

The data collection was performed through an individual interview, with an estimated time of approximately 10 minutes, at the workplace, where there was an explanation about the research, ensuring the necessary clarifications for the appropriate consent and possible doubts regarding the language/nomenclature used in the questionnaire. The data were collected in the period of August and September 2016. Based on the objectives adopted, the data collected were submitted to simple statistical analysis and made available through tables and/or graphs, with the help of the Excel Office 2010 program, where they were statistically analyzed in the period described above and based on the relevant literature.

The research project was forwarded and approved by the Ethics and Research Committee of Patos Integrated College through the CAAE: 56547216.2.0000.5181 and Protocol no. 1,684,931, in which it obtained the legal consent to carry out the research in the light of ethical principles. The research was performed with the authorization of the Secretary of Health of the municipality of Patos - PB, strictly following the Directives and Norms Regulating the Research Involving Human Beings of the National Health Council [8-10].

Results

The results are shown in Table 1 and 2, further in Figures 1, 2 and 3

Table 1. Socio-demographic data of the sample (N = 30).

<table>
<thead>
<tr>
<th>Socio-demographic data of the sample</th>
<th>Frequency f</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>13,33</td>
</tr>
<tr>
<td>Female</td>
<td>26</td>
<td>86,67</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 25 years</td>
<td>2</td>
<td>6,67</td>
</tr>
<tr>
<td>26 - 30 years</td>
<td>8</td>
<td>26,67</td>
</tr>
<tr>
<td>31 - 35 years</td>
<td>18</td>
<td>60</td>
</tr>
<tr>
<td>36 - 40 years</td>
<td>1</td>
<td>3,33</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>1</td>
<td>3,33</td>
</tr>
<tr>
<td>Professional qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Specialist</td>
<td>24</td>
<td>80</td>
</tr>
<tr>
<td>Graduate</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Formation Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 1 - 3 years</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Between 4 - 7 years</td>
<td>13</td>
<td>43,33</td>
</tr>
<tr>
<td>Duration of the APH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Between 1 - 3 years</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Between 4 - 7 years</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>More than 7 years</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Frequency with which they receive training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 per year</td>
<td>23</td>
<td>76,67</td>
</tr>
<tr>
<td>2 per year</td>
<td>7</td>
<td>23,33</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 2. Data regarding the benefits and complications of the tourniquet (N = 30).

<table>
<thead>
<tr>
<th>Questions</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the greatest benefit of tourniquet application?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemostasis</td>
<td>18</td>
<td>60</td>
</tr>
<tr>
<td>Control of hypovolemic shock</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>What is the biggest complication related to the use of the tourniquet?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tissue necrosis</td>
<td>20</td>
<td>67</td>
</tr>
<tr>
<td>Loss of members</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Increased bleeding</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Embolism</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research data, 2016

Discussions

Table 1 shows the socio-demographic data of the professionals working in the Regulation Center of the Mobile Emergency Care Service (SAMU 192) in the municipality of Patos - PB. According to the gender of professionals, it is noted that 86.67% (26) are of the female gender, while 13.33% (4) of the male. As for the age group, it is observed that 6.67% (2) of the professionals are between 20 and 25 years old, 26.67% (8) between 26 and 30 years of age, 60% (18) between 31 and 35, others 3.33% (1) with age ranging from 36 to 40 years, and 3.33% (1) of the professionals are older than 40 years.

The care as a female predominance leads to the construction of heterogeneous discourses related to sex, which determine a certain rivalry with regard to care, since, according to the social imaginary, the hospital environment, where care for patients is dispensed, is not a place for men, since it is a universe destined for women, since they have as main characteristic the role of caregiver [11].

According to the qualification of the professionals, it was observed that 10% (3) are masters, 80% (24) specialists, and 10% (3) only have undergraduate. According to the training time, the research revea-
led that 10% (3) of the respondents had between 1 and 3 years of training, 43.33% (13) between 4 and 7 years, and 46.67% (14) more than 7 years of training. Regarding the pre-hospital care acting time (APH), 20% (6) have less than 1 year of service in the area, 40% (12) are linked to APH between 1 and 3 years, 30% (9) between 4 and 7 years, and 10% (3) has been working in this segment for more than 7 years.

However, professionals were asked about how often they received training, and the results showed that 76.67% (23) of the respondents stated that they only receive 1 training annually, while 23.33% (7) update or recycle their training knowledge at least 2 times a year.

The need for training and participation of health professionals in continuing education programs is essential, so that they can identify potential risk situations, occupational diseases and propose alternatives to protect their own health and the victim. It is important that they promote update on standard and specific precautionary measures, through training and updating courses [12].

According to Table 1, which questions the definitive treatment of bleeding, 93% (28) of the interviewees reported that the hemorrhage that needs to be treated in the hospital environment is the internal hemorrhage, usually because it requires surgical intervention. Only 7% (2) reported that external hemorrhage should be treated in the hospital, which diverges with some studies that point out that this type of injury should receive intervention even at the scene of the accident, evidenced by the risk of blood loss contributing to the worsening of the victim during the transport to the prompt service.

External bleeding should and can be contained in the setting where the victims are. After hemodynamic control, the patient should be transported to the hospital for continued care. Given that in the Prehospital Care (APH) some definitive behaviors are ineffective, it can be stated that the treatment for internal bleeding is specific to the in-hospital environment.

The classify the hemorrhages as external and internal. In the external, there is extravasation of blood volume to the external environment, generated by injuries, as, for example, the cutting caused by a knife. Therefore, these lesions must be identified and treated early in order to save on loss of blood volume. The treatment begins by direct compression on the wound using appropriate material such as gauze and strips or a clean cloth, placed on the wound and moderately pressed. Subsequently, priority should be given to transportation to the appropriate hospital resource by the medical emergency teams [13].

In internal hemorrhage, extravasation of blood from the vessels to the internal compartments occurs, preventing the identification of the trauma by simple visualization. In this case, a significant amount of blood can accumulate in the cranial, thoracic, abdominal and pelvic cavities, as in the case of hip fractures. Persistent edema of a particular region, absence of local pulse, cyanosis and hypothermia may represent important indicators of internal hemorrhage. In this type of hemorrhage, it should be prioritized the rapid transportation, the initial care to the traumatized one, which includes the warm up of the victim and care with the impediment of the ingestion of liquids and foods [14]. 97% (29) of the interviewees stated that hemorrhage of arterial origin results in worse prognoses, compared to the clinical picture of the victim. 3% (1) reported that venous hemorrhage had the greatest influence on patients' worsening, or severity of wounds. It was observed that the responses to the bad prognoses of patients who had capillary haemorrhages were null.

Some factors may interfere with the severity of bleeding, such as volume lost, the vessel size, the rate of loss, as well as the type of vessel (artery or vein). In this context, there was a concern of the participants of the study regarding the hemorrhage
of arterial origin, since this one besides being difficult to control presents a very high mortality.

The hemorrhage of arterial origin is characterized by the presence of live, light red and viscous blood, jetting according to each heartbeat, while venous blood leakage occurs in a continuous flow, under low pressure, of a dark color. Capillary haemorrhages flow from tiny vessels of the wound, do not bring hemodynamic complications to patients and are easily controlled [15].

Recalling the severity of hemorrhages, authors affirm that when a person suffers some type of vascular injury that results in hemorrhages, such as a deep cut, a traumatic amputation or exposed fracture, immediately there is a decrease in oxygenation of tissues, which can induce tissue necrosis, leading to death of the individual or even permanent disabilities [13].

Figure 1 reports the first-choice method for restraining non-severe external bleeding. Through the results, it was observed that 97% (29) of the participants of the study stated that the priority method is that of direct compression, while 3% (1) reported that digital pressure on the pulse point was necessary for this control.

In this perspective, it is worth noting that the choice is compatible with the PHTLS (Traumatized Life Support in the Prehospital) protocol, which describes direct compression as the most effective and first-choice method for controlling external hemorrhage, whether serious or not.

Direct compression by the hand, applied to the hemorrhage site, is the initial technique used to control external hemorrhage according to Phtls [7]. The method is quick and efficient. It consists of compressing the site between 10 and 30 minutes with compresses or with the gloved hand itself, without reducing the compression if the hemorrhage is not controlled, being necessary, in this way, to put gases on each other until looking for other methods. The ability of the body to respond to and control bleeding depends on (1) the size of the vessel, (2) the pressure inside the vessel, (3) the presence of coagulation factors, and (4) the possibility of the injured vessel being in spasm.

In 2007, finger pressure on the pulse points of an artery against the bone surface could be used if direct compression or elevation of the limbs failed. Currently, when direct compression fails, the guideline is to apply the tourniquet to the victim as a mean to contain the hemorrhage [16].

If it is observed in Figure 2, 67% (20) of the interviewed professionals have a method of initial choice for restraining severe external hemorrhage, especially if it occurs in the limbs is the tourniquet, while 33% (10) reported that direct pressure was the most indicated method, regardless of the type, site or degree of bleeding severity.

The more current conduct regarding the use of the tourniquet emphasizes that regardless of whether or not the hemorrhage is severe, the intervention to be followed will always have as a first choice method the direct compression, associated with compressive dressings performed with elastic bandages or inflatable screens. Only the tourniquet will be used if this alternative fails [16].

It is important that the rescuer does not limit himself to the dramatology of the scene, since although he classifies the hemorrhage as severe, with an imminent risk of death for the victim, it is necessary to establish the protocol of initial care for the traumatized, taking into account the real risks and benefits of tourniquet application.

If an external hemorrhage in a extremity cannot be controlled by pressure, the application of the tourniquet is the next logical step to control bleeding. Tourniquets were left out because of concerns about potential complications, including nerve and blood vessel damage and potential limb loss if the tourniquet was left for an extended time. None of this has been proven and, indeed, during the wars of Iraq and Afghanistan, it has been shown just the opposite. Data from the military experience suggest that properly applied...
tourniquets could prevent 7 out of 100 deaths in combat. Tourniquets have been widely used in the operating room for many years, presenting satisfactory results, showing that if used properly, they are not only safe but also save lives [16].

A study carried out in Paraíba indicates that the trauma of the extremities, involving mainly the lower limbs, occupies 67% of all the traumas attended in the ready care [17].

Although common in victims, limb trauma rarely presents an immediate risk of death. It may be at risk when associated with blood loss. It is often found on a daily life, and is usually of little gravity, but can cause shock, damage to blood vessels and nerves [18].

The importance of these injuries, since although they may not present life-threatening risks for the injured, on the other hand, they are responsible for a large part of the immobilizations and, consequently, the lost of functional independence of these people, even if temporary [19].

According to Figure 3, according to the time of permanence of the tourniquet, 63% (19) of the interviewees showed that the tourniquet was loosened after 10 minutes of its application, 20% (6) after 15 minutes and 17% (5) guided not to loosen it after it has been used.

It is known that the application of the tourniquet generates many controversies in the prehospital and hospital emergencies, through some risks that it can bring. Based on this premise is the innumerable doubts of the professionals regarding the correct application of the tourniquet as well as the need to loosen or not the method if it is to be used for the control of hemorrhages. In this sense, the results indicate that most professionals are based on alternatives not contemplated by the current protocol of initial care to the traumatized.

It is important to emphasize the importance of constant training in order to improve the knowledge regarding the conduct of the aforementioned technique/procedure. It is believed that practitioners that have misjudged their choices by limiting themselves to out-of-date protocols, out of the current year, which states through PhTs [16] that the tourniquet once applied should not be loosened.

Tourniquets can be used safely for up to 120 to 150 minutes, without significant nerve or muscle damage. Even in suburban or rural environments, where often the time of transport of the patient to the hospital is much shorter than that period. In general, a tourniquet placed in Prehospital Care (APH) must remain until the patient reaches the definitive treatment site (at the nearest hospital). Military studies did not show the occurrence of significant deterioration associated with prolonged use of the method. If the tourniquet is required, the patient will probably need emergency surgery to control the hemorrhage [16].

Reports that the urgency and emergency service aims to reduce morbimortality and impacting sequelae. For this reason, it must have a good infrastructure, trained staff, equipment and materials so that it can have an integrated and good quality assistance. In addition, this service needs immediate response in the care of people with risk of death. It should have a skilled and easily communicated team, as well as the ability to make quick decisions, as it will provide care to patients who need medium care and high complexity [20].

According to the data shown in Table 2, it is well known that for 60% (18) of the interviewees the greatest benefit of the tourniquet is related to hemostasis, while 40% (12) related benefit to the control of hypovolemic shock, in the direction of the application avoids its manifestation until the stage considered lethal for the individual.

Hypovolemic shock is the most common type of shock, usually due to major bleeding (from 700 to 1,300 ml of blood loss). In this condition, the intravascular volume decreases, leading to venous return and decreased systolic volume, as well as peripheral perfusion and flow. The main objective in the treatment of shock is not only to control hemorrhage-
ge, but also to replace water to reverse the possible harmful effects [21].

To Phtls wider tourniquets are more effective in controlling hemorrhages since they control bleeding at a lower pressure. There is an inverse relationship between the width of the tourniquet and the pressure required to occlude the arterial flow. In addition, a very narrow band is also more likely to cause damage to the arteries and superficial nerves [16].

If the patient does not respond after application and initiates treatment through fluid replacement, the irreversible phase of the shock can set very quickly, ceasing all compensatory means, causing multiple organ failure, which usually begins with renal insufficiency and ends with cardiac arrest.

For 67% (20) of the interviewees, the greatest complication of the tourniquet is related to the risk of tissue necrosis, 27% (8) to the risks of amputation, and totaling 3% (1) individually, evidenced the risks of increasing initial hemorrhage and causing embolism. Analyzing the question holistically, we understand that the worst complication related to the applicability of the tourniquet is limb loss. Most of the professionals were not mistaken in their answers, because tissue necrosis occurs after 6 hours of anoxia, a condition that could also lead to total limb amputation. According to several segments of the emergency, the main goal of the tourniquet is to save the life of the victim, even if the limb does not remain intact.

Although there is a small risk that part or all of the limb will be sacrificed, considering the choice of losing a limb or saving the patient’s life, the obvious decision is to preserve life [16].

Conclusions

The application of the tourniquet is important for the preservation of life. In situations where bleeding is severe and the body can not compensate for the volume of blood lost quickly enough, the situation becomes an emergency, requiring the use of this technique.

Through the analysis, it was observed that the professionals are aware of the definitive treatment related to the types of hemorrhages, as well as of the factors that interfere in the severity and the prognosis of the blood loss. They would be able to conduct any of the types of hemorrhage, but they were out of date with the applicability of the tourniquet, which was once the first-choice method for restraining a hemorrhage.

The doubt about the loosening of the tourniquet is a common condition for all emergency services, since the indication of the same remains applied until the arrival of the victim in the hospital where he will receive the definitive treatment was updated shortly. Thus, it is believed that the rescue team is still stuck to outdated protocols, and it is necessary for the health institution to expose them to new information, through updates and training.

By analyzing the arguments described in the discussion, the study exposed the importance of pre and in-hospital nursing care, which, according to the norms established by the urgency and emergency protocols, contribute mainly to the good prognosis of the victims. The research not only encourages the improvement of the professionals of the area, but also of academics and scientific population that harmonize with this theme. Thus, as the bibliographic collection in this context is precarious, it becomes an incentive for future research in the area.

References


