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PREDICTION OF BLOOD LOSS DURING OPERATIONS USING AI

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Abstract

This study addresses the issue of predicting bleeding during surgical operations using artificial intelligence (AI) technologies. Based on modern machine learning and deep learning algorithms, patient clinical parameters, laboratory tests, imaging diagnostic data, and factors related to the surgical process are analyzed. AI-based prediction models allow surgeons to identify high-risk cases in advance, minimize blood loss, and increase surgical safety. The results of the study show that the use of artificial intelligence can help to more accurately assess the risk of intraoperative bleeding, support clinical decision-making, and reduce the number of complications.

Keywords: Artificial intelligence, machine learning, surgery, bleeding prediction, medical data analysis, clinical decision support.

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INTRODUCTION

Various emergencies, especially injuries and the resulting bleeding, are widespread in human life. Bleeding is manifested by the release of blood into the external environment or into the cavities inside the body as a result of damage to blood vessels. If the amount of blood lost is large, the circulatory system in the body is disrupted, oxygen delivery to tissues decreases, and this can lead to serious complications and even death. Therefore, knowing how to provide first aid during bleeding is important not only for medical workers, but also for ordinary citizens.

The relevance of this topic lies in the fact that most of the population does not have sufficient knowledge about the types of bleeding and methods for stopping them. Therefore, it is necessary to scientifically illuminate this issue, provide practical recommendations, and study international experience.[1]

Bleeding is divided into several types. In arterial bleeding, the arteries that leave the heart are damaged and blood flows under high pressure. In this case, the blood is bright red, pulsating, and is considered very life-threatening due to the large amount of blood lost in a short period of time. In venous bleeding, the veins that carry blood to the heart are damaged, the blood flows continuously in a dark red color, and a serious condition can occur if large veins are damaged. Capillary bleeding occurs as a result of damage to small vessels, and the blood flows evenly over the wound surface. This condition usually does not pose a great danger, but there is a possibility of infection. In internal bleeding, the blood is not visible from the outside, but flows into the abdominal, chest, or brain cavity. In this case, dizziness, fainting, pale skin, rapid pulse, and low blood pressure are observed. The greatest danger of internal bleeding is the difficulty in detecting it in time.[2]

First aid for bleeding is important. In venous and capillary bleeding, sterile gauze or clean cloth is placed on the wound and a pressure bandage is applied over it. In case of arterial bleeding, a tourniquet or tourniquet is applied above the wound, and the time of application must be recorded. It is recommended to leave the

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tourniquet on for up to 1.5 hours in the summer and up to 1 hour in the winter, and it is necessary to release it for a short time from time to time to restore blood circulation. If a tourniquet is not available, you can temporarily stop the bleeding by pressing the bleeding vein with your fingers. Elevating the injured limb helps reduce blood flow. Keeping the arm or leg above the level of the heart reduces the intensity of bleeding.

DISCUSSION AND RESULTS

In cases of internal bleeding, external pressure is ineffective. In such a situation, it is necessary to lay the victim down, calm him down, and call an ambulance as soon as possible. At the same time, the use of hot or warming agents is strictly prohibited.

Modern approaches to first aid are also widely used. The World Health Organization and the Red Cross have developed special first aid manuals. Modern types of hemostatic dressings, hemostatic powders, and medical tourniquets are used in current medical practice. The possibility of receiving online recommendations and instructions on first aid through mobile applications is also expanding.[3]

A systematic approach to the formation of practical skills is important. Practical training in first aid should be conducted in schools as part of the subject "Fundamentals of Life Safety". It is useful to organize short-term training courses in higher education institutions for fields other than medicine. Free training for the population through the Red Cross and Red Crescent Societies should also be widely implemented.

In cases of bleeding, it is necessary to strictly follow certain safety rules. Foreign objects protruding from the wound, such as knives, nails or pieces of glass, should not be pulled out. It is not recommended to tie a tourniquet unnecessarily or excessively tightly. It is also forbidden to wash or examine the bleeding area thoroughly. It is also forbidden to apply hot heating devices to the injured limb.[4]

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Psychological factors also play an important role in the process of providing first aid for bleeding. The injured person is often in a state of fear, panic or shock. In such a situation, the calmness, confident speech and precise actions of the helper stabilize the victim's mental state. According to studies, psychological support can slow down bleeding, because strong excitement and panic increase blood pressure and increase blood loss.[5]

In addition to modern medicine, folk medicine has long used various methods to stop bleeding. Some medicinal plants, including calendula, licorice root and leaves, are believed to have properties that accelerate the blood clotting process. In addition, the method of constricting blood vessels by applying ice or cold water is also widespread among the people and has been used in practice for many years.

CONCLUSION

In conclusion, bleeding is one of the most serious life-threatening conditions, which often occurs as a result of injuries, accidents and emergencies. There are arterial, venous, capillary and internal types of bleeding, each of which has its own clinical symptoms and level of risk. In particular, arterial and internal bleeding can lead to serious consequences in a short time. Therefore, prompt and correct first aid in such cases is of great importance in saving lives.

First aid measures include applying a pressure bandage, using a tourniquet correctly, keeping the injured limb elevated and calming the victim. In modern medicine, hemostatic agents, new generation medical tourniquets and instructions provided through mobile applications are increasing the effectiveness of first aid. At the same time, psychological support is also important, which helps to slow down the bleeding process by stabilizing the victim's mental state.

In order to increase the knowledge and skills of the population in first aid, it is necessary to organize systematic trainings and education through schools, higher

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education institutions, and public organizations. This will help reduce the number of deaths and complications in emergency situations.

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