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THE TRANSFORMATIVE IMPACT OF ARTIFICIAL INTELLIGENCE AND DATA ANALYTICS ON HEALTHCARE IN WARTIME

ТРАНСФОРМАЦІЙНИЙ ВПЛИВ ШТУЧНОГО ІНТЕЛЕКТУ ТА АНАЛІЗУ ДАНИХ НА ОХОРОНУ ЗДОРОВ'Я ПІД ЧАС ВІЙНИ

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The transformative impact of Artificial Intelligince (AI) and data analytics (DA) on healthcare becomes particularly pronounced in the context of war, where conventional healthcare systems are disrupted, and resources are stretched. AI and DA play a crucial role in crisis management during war by providing actionable insights, optimizing resource allocation, and enabling swift, data-driven decisions to protect civilians, manage resources, and support healthcare. In a country at war, the adoption of digital health technologies and tools can bridge the gap between diminished healthcare capacity and the urgent medical needs of affected populations. During war, many healthcare facilities may be destroyed or inaccessible. Telemedicine enables remote consultations, allowing patients in conflict zones to receive medical advice and follow-up care without needing to travel to a hospital.

Digital platforms connect patients and healthcare professionals from larger medical centers with more experienced personal or specialists across borders, enabling international doctors to provide advice and expertise when local resources are limited or unavailable [1, p. 2].

Mobile health and emergency response with rapid health problems assessments in war-torn areas can help humanitarian organizations and governments conduct rapid timely delivery of medical assistance where it's needed most. Digital tools can collect real-time data on injuries, disease outbreaks, and other health issues, improving the speed and accuracy of emergency response efforts. This allows aid agencies to adapt quickly to changing health needs on the ground. AI can analyze data on population movements, environmental hazards, and disease trends to predict healthcare needs, helping organizations allocate resources more effectively in conflict zones. In war zones, the overwhelming number of injuries can make manual triage challenging. AI-powered systems can analyze patients' symptoms, injuries, and vital signs to prioritize those needing urgent care. AI algorithms can assist healthcare providers in making rapid triage decisions, ensuring the most critical patients receive attention first. AI can enable remote diagnosis for patients who cannot reach hospitals due to conflict. AI-driven platforms can analyze symptoms described through telemedicine tools, helping healthcare providers determine if patients need in-person care or can be managed remotely. Predictive DA and AI can analyze data such as injury patterns, disease outbreaks, and population movements to predict medical needs. Predictive analytics helps allocate resources like medicine, surgical supplies, and medical staff to areas where they are most needed, reducing shortages in high-demand zones. Early identification of shock secondary to hemorrhage is associated with improved patient outcomes, especially in battlefield conditions. The Trauma Triage Treatment with wearable sensors to measure vital signs that using algorithm on a smartphone can identify impending shock. The algorithm is capable of predicting shock as early as 90 minutes before the onset of overt manifestations, with 75% overall accuracy [3, p 3]. These tools could empower medical workers to more quickly and accurately initiate fluid resuscitation and prevent hypovolemic shock in wounded patients [4, p. 3]. AI can be used to monitor and optimize medical supply chains in conflict zones. Machine learning models can predict where shortages of drugs, equipment, or personnel might occur, enabling proactive resupply before critical gaps emerge.

In war settings in wounded patients time is critical for diagnosing trauma injuries. AI-powered imaging tools can analyze X-rays, CT scans, and MRI results quickly, identifying fractures, internal bleeding, and other issues. These systems can prioritize cases that need urgent attention, speeding up the diagnostic process.

Also, AI algorithms can assist in detecting diseases like infections or respiratory conditions common in refugee camps or overcrowded shelters. AI-driven diagnostic tools can analyze patient symptoms and test results, helping healthcare providers identify and treat illnesses early [5, p. 3].

Medical and surgical AI-driven robots play a very important role on the battlefield. In areas where traditional transport is compromised, drones or autonomous robots can be used to transport injured patients, deliver medical supplies such as blood, vaccines and essential medicines. AI optimizes delivery routes to ensure timely and safe distribution, especially in aggressive environments. Surgical robots with artificial intelligence can help medical personnel perform complex operations in dangerous or remote locations. These robots can be used to precisely perform minimally invasive procedures, reducing the need for large medical teams and improving outcomes in field hospitals. Automated Surgical Assistance: AI-powered robotic systems can assist surgeons in performing complex operations, especially in field hospitals or remote areas. These systems can enhance precision and reduce the risk of human error in high-stress environments, improving surgical outcomes. Surgeons in safer locations can perform surgeries on patients in conflict zones by controlling AI-assisted robots remotely. This allows for specialized medical care to reach those in isolated or dangerous areas without risking the lives of additional medical personnel. AI-guided robotic systems enhance the precision of plastic surgery procedures. In microsurgeries, such as nerve or blood vessel reconstructions, robotic systems can work with greater accuracy and stability than human hands, reducing complications.

Very important role AI and DA in plastic and reconstructive surgery. In wartime scenarios, plastic and reconstructive surgery often plays a crucial role in treating soldiers and civilians who suffer from traumatic injuries, burns, and other disfigurements. AI has the potential to revolutionize this field, especially in the context of urgent, high-stakes environments. AI-driven software helps surgeons create precise 3D models of a patient's anatomy, enabling virtual simulations of surgical outcomes. This technology is particularly useful in facial reconstruction, breast augmentation, or rhinoplasty. AI-powered platforms are being developed to assess wounds, burns, and scars. Using image recognition, these systems can determine the severity, suggest treatments, and track healing progress over time, which is particularly valuable for reconstructive surgeries post-injury. AI is assisting in tissue engineering by predicting how skin grafts or other transplanted tissues will behave. It can also be used to optimize skin graft designs or improve fat grafting techniques, which are common in reconstructive surgery. AI helps process and analyze large datasets from past surgeries and patient outcomes, identifying trends and patterns that can improve future

surgical techniques and patient safety. This has implications for improving evidence-based practices in plastic and reconstructive surgery.

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