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# CURRENT ASPECTS OF ORGANIZING SURGICAL SUPPORT IN A COMBAT ZONE

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Organizing surgical assistance in contemporary war zones constitutes a particularly challenging aspect of battlefield healthcare. Distinct from standard trauma care, combat medicine is defined by uncertainty, scarcity, severe time pressures, and constant dangers to both the injured and the medical personnel. The necessity of providing instantaneous and efficient surgical intervention in or near combat zones has revolutionized both the organizational frameworks and the operational methodologies of military medical services.

Present-day conflicts, characterized by hybrid warfare, guerrilla strategies, and a high incidence of blast injuries, have driven the transformation of surgical support from fixed, rear-echelon hospitals to mobile, frontline-deployable units. Surgical teams are now confronted with a double burden: saving lives amidst active combat, while simultaneously navigating unreliable supply lines and austere clinical environments. The types of injuries encompass complex polytrauma, including: penetrating wounds, traumatic amputations, internal bleeding, crushing injuries, and significant burns. Such injury patterns mandate prompt and skilled surgical interventions, frequently within the critical "golden hour" following injury. Therefore, surgical support is increasingly being positioned in forward areas, equipped with rapid-response capacities [1].

Effective trauma management within this context hinges upon a cohesive network of elements: the deliberate positioning of surgical units, proactive placement of medical supplies, comprehensive training focused on damage control techniques, and a highly efficient evacuation pathway. Medical evacuation (MEDEVAC) is vital, ensuring a seamless link between prehospital stabilization and operative care. In environments characterized by intense conflict, delays in receiving surgical treatment are directly linked to greater rates of illness and death. Consequently, operational strategies prioritize locating Role 2 or advanced Role 1 surgical teams close to the frontlines. These units must be ready to perform damage control surgery and ready patients for onward transfer. A key difficulty in coordinating surgical support revolves around sustaining high-quality clinical performance when facing significant environmental and operational stressors. Medical staff often operate within makeshift, rudimentary facilities. They cope with intermittent power supplies, limitations in sterilization, and communication breakdowns. Notwithstanding these hardships, patient survival has seen improvement due to the consistent implementation of modular surgical configurations, standardized team protocols for trauma cases, and swift assessment approaches. The progress made is greatly attributed to the knowledge gained from experiences in Iraq, Afghanistan, and existing conflict zones such as Ukraine, where continuous adaptation remains a key principle [3].

The proficiency of surgical teams, alongside how well they are put together, is paramount to achieving favorable outcomes. Forward surgical teams (FSTs) are usually comprised of trauma surgeons, anesthesiologists, nurses, and medics. They are thoroughly versed in both resuscitation techniques used on the battlefield and emergency interventions. The core aim of these teams is to undertake damage control surgery (DCS). The primary goal of DCS is to stabilize a patient's bodily functions, as opposed to striving for definitive repairs. The interventions associated with this type of surgery encompass procedures such as thoracostomies, laparotomies designed to stop bleeding, fasciotomies, and, when there is no other recourse, limb amputations. DCS is essentially practical: carry out surgical procedures with speed, bring hemorrhaging under control, reestablish circulation, and then facilitate the patient's transfer to higher-level care [2].

Nevertheless, even the most skillfully trained surgical teams can be severely hindered if they have not undergone ample preparation prior to deployment. This understanding has driven the creation of advanced training systems, designed to replicate the stresses of combat situations. For example, the armed forces of several European countries have increasingly incorporated simulation-based prolonged field care (PFC) into their training programs. The purpose of this addition is to help medical staff operate for extended periods of time where rapid evacuation is unavailable [4]. Through these simulations, medical teams gain experience in maintaining patients for up to 72 hours. These activities ensure that proper ventilation, blood flow, nutritional needs, and control of infections are maintained while working within the limitations of the field. The deployment of cutting-edge technology has also contributed to the effectiveness of surgical teams working in deployed settings. Portable ultrasound devices, mobile blood transfusion setups, and small, easily carried surgical kits are now available. They empower field teams to carry out diagnostic assessments and medical interventions that were once confined to established hospital environments. Beyond bolstering survival rates, these advancements have also expanded the breadth of care available in field settings. They facilitate intervention for internal injuries and the ability to manage delayed complications. Moreover, the adoption of telemedicine tools allows specialists to provide consultations from a distance, supplying essential decision-making support to surgical teams functioning in isolated environments [1].

In essence, the fluid character of contemporary combat necessitates not only surgical expertise at the tactical level but also adaptability at the operational level. The future of battlefield surgery centers on versatile, modular systems that are designed for rapid relocation, flexible team configurations, and the ability to amplify capacity in response to mass casualty incidents. This level of adaptability is crucial in protracted conflicts, where medical assets must undergo repeated reconfiguration in response to shifts in the frontlines, fluctuating casualty loads, and tactical priorities.

A further crucial aspect of surgical support organization involves the proficient execution of medical evacuation (MEDEVAC), acting as the critical link between the point of injury and advanced medical care. The MEDEVAC system is not simply a logistical pathway; it embodies an extension of clinical decision-making within the high-pressure environment of combat. Expedited and secure evacuation is a pivotal factor in determining whether a soldier with critical injuries can survive the critical "platinum ten minutes" and the "golden hour," periods of time that are closely linked with trauma survival rates. The modern MEDEVAC approach integrates triage processes, medical care provided during transport, telemedical support, and close collaboration between field teams and medical facilities [1].

Helicopter evacuations continue to represent the preferred standard for swift transport, especially in environments with inadequate infrastructure or where roads are exposed to enemy fire. However, these missions require careful planning: flight routes must be designed to circumvent areas of hostility, aircraft must be equipped with capabilities for in-transit medical support (e.g., oxygen provision, transfusion capabilities, ventilatory support), and medical teams must be prepared to stabilize patients amidst turbulence or under threat [3].

A successful surgical outcome's definition stretches far beyond immediate stabilization and evacuation protocols. Post-operative care and psychological recuperation form the second critical phase in treating battlefield injuries. Soldiers enduring major combat surgeries frequently navigate intricate recovery journeys, involving supplementary surgical interventions, physical therapy, and mental health treatment. Specifically, survivors of blast injuries are at elevated risk for post-traumatic stress disorder (PTSD), depression, and survivor's guilt. Such conditions exacerbate recovery challenges, lessen treatment adherence, and can hinder a return to military service or civilian life [1].

Contemporary battlefield medicine, therefore, integrates early mental health support within surgical treatment pathways. Trained mental health professionals, like trauma psychologists, are frequently integrated with surgical units or stationed at stabilization locations to deliver immediate psychological first aid (PFA), crisis intervention, and continued monitoring. Furthermore, programs aimed at decreasing burnout and secondary trauma among surgeons and medical personnel have recently emerged, recognizing the detrimental impact cumulative psychological strain can have on team performance and decision-making in high-pressure situations [3].

Rehabilitation continues to be a prolonged process often lacking sufficient resources. Soldiers with amputations, spinal cord injuries, or facial trauma necessitate comprehensive, multidisciplinary care involving prosthetics, reconstructive surgery, pain management, and psychosocial adaptation. Sadly, many frontline surgical units lack even basic follow-up infrastructure, shifting the burden to military rehabilitation centers or veteran care systems once discharge occurs. This emphasizes the crucial need for robust communication between combat-zone surgical teams and rear-area rehabilitation centers, guaranteeing consistent care and comprehensive long-term treatment planning. From a strategic viewpoint, structuring surgical support in combat environments demands anticipatory planning. Military health strategists must predict shifts in casualty patterns, guarantee scalable infrastructure, and develop doctrine-guided responses to mass casualty incidents (MCIs). The unpredictable nature of modern warfare – whether arising from drone strikes, cyber disruptions of medical supply chains, or geographically dispersed simultaneous engagements – necessitates built-in redundancy and resilience within every surgical unit. Integrating AI-enhanced triage systems, modular operating rooms, and flexible personnel deployment procedures will be vital for future-proofing surgical care frameworks. Furthermore, there's an escalating recognition of the need for surgical support to be culturally and geopolitically sensitive. In coalition operations, disparities in training, ethical guidelines, and medical autonomy amongst allied nations can result in friction or care delays. Standardization efforts, such as NATO STANAGs (Standardization Agreements), combined trauma registries, and multinational pre-deployment exercises have demonstrated promise but have yet to be uniformly implemented [2].

To summarize, the organization of surgical support within combat zones has become an elaborate, multi-faceted system, harmonizing clinical demands with tactical practicality. From pre-deployment training and modular surgical teams to MEDEVAC integration and psychological rehabilitation, each segment acts as a component of an encompassing survival chain. Modern combat surgery has extended beyond the operating table – it embodies a strategic, technological, and ethical undertaking. Ongoing innovation, refinement of medical doctrine, and mental fortitude are crucial to ensuring that those wounded during war not only survive, but also have a viable pathway toward recovery, reintegration, and preserving their dignity.

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# СУЧАСНЕ УЯВЛЕННЯ ПРО ВІРУС ПАПІЛОМИ ЛЮДИНИ (ОГЛЯД ЛІТЕРАТУРИ)

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Вірус папіломи людини (ВПЛ) - це поширена інфекція, що передається статевим шляхом і може вражати шкіру, геніталії та інші органи. Наразі відомо понад 200 типів цього вірусу, у деяких людей ВПЛ протікає безсимптомно, у інших викликає бородавки чи генітальні кондиломи, а в окремих випадках може призводити до розвитку передракових змін чи навіть раку. [1]

За даними European Cancer Organisation, вірус папіломи людини щорічно провокує близько 90 000 випадків раку в Європі. Найпоширенішим серед них є рак шийки матки, який займає четверте місце серед онкологічних захворювань у жінок. У 2022 році було зареєстровано близько 660 000 нових випадків цього захворювання і 350 000 пов'язаних із ним смертей. [2]

У зв'язку з цим особливої актуальності набувають питання ранньої діагностики, вакцинації та підвищення обізнаності суспільства щодо шляхів передачі та наслідків інфікування. У цій статті розглянемо сучасні уявлення про ВПЛ, його клінічні прояви, роль у розвитку онкологічних захворювань, а також ефективні стратегії боротьби з ним.

**Будова вірусу**

Вірус папіломи людини є невеликим ДНК-вмісним вірусом діаметром близько 60 нм, що складається з 72 капсомерів, які формують капсид, усередині якого розташований циркулярний дволанцюговий ДНК-геном. Геном ВПЛ містить регуляторну ділянку, два структурних білки (L1 і L2) та кілька ранніх білків (E1–E7). Саме ранні білки беруть участь у реплікації вірусу та, у випадку високонкурентних типів, відіграють роль у розвитку злоякісних новоутворень. Основним білком капсиду є L1, який здатен самостійно формувати вірусоподібні