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Burn Care Management and Skin Bank Services for Defence Personnel

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Abstract
Burn injuries are a major cause of morbidity and mortality among defence personnel due to combat operations, training accidents, and disaster response activities. In extensive burns where autologous skin is insufficient or temporarily unavailable, cadaveric skin allografts from skin banks play a critical role in wound management. This review evaluates the role, organization, clinical utility, and strategic importance of skin banks within defence medical services, based on available literature, international guidelines, and military medical practices. Evidence suggests that skin banks significantly improve survival, reduce complications, and enhance preparedness for mass casualty situations, particularly when integrated within tertiary military hospitals. Strengthening skin banking facilities is therefore essential for modern defence medical services, as they represent both a clinical necessity and a strategic asset in the management of combat-related burns and national disaster response.

Keywords: Burn injuries; Skin bank; Cadaveric skin allograft; Armed Forces Medical Services; Military medicine;

I. Introduction

Burns are among the most devastating injuries encountered in defence services due to the nature of military operations involving fire, explosives, chemicals, electricity, and high-energy trauma. Large surface area burns often exceed the availability of autologous skin for grafting. Skin banks address this gap by supplying processed cadaveric skin for temporary wound coverage. For defence services, an organized skin bank system is not only a medical necessity but also a strategic asset during war, mass casualties, and natural disasters.

II. Historical Background of Skin Banking

The use of cadaveric skin as a biological dressing dates back to World War II, when military surgeons recognized its value in managing extensive burns. Advances in tissue preservation, aseptic harvesting, and cryopreservation during the late 20th century led to the establishment of formal skin banks worldwide. Armed forces medical services in several countries have since integrated skin banks into their burn care and disaster response systems.

III. Rationale for Skin Banks in Defence Services

3.1 High Incidence of Burn Injuries
Defence personnel are exposed to: - Combat-related explosions and incendiary weapons - Aircraft and vehicle accidents - Naval fires and fuel burns - Industrial and training-related mishaps

3.2 Limitations of Autografting
- Insufficient donor sites in major burns
- Hemodynamic instability of patients
- Need for staged surgical procedures

3.3 Strategic and Operational Needs
- Rapid availability of skin during mass casualty situations
- Self-reliance during wartime or remote deployments
- Support to civilian authorities during disasters

IV. Organization of a Skin Bank for Defence Services

4.1 Infrastructure
A defence skin bank should ideally be located within or linked to a tertiary care military hospital with a burn center. Essential components include: - Dedicated harvesting and processing area - Microbiology and serology support - Cryopreservation and cold storage facilities - Documentation and traceability systems

4.2 Donor Selection and Consent
- Donors are usually deceased individuals following brain death or cardiac death
- Informed consent from next of kin is mandatory

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- Donor screening includes medical history, physical examination, and risk assessment

4.3 Screening and Safety

Mandatory testing includes: - HIV 1 & 2 - Hepatitis B and C - Syphilis - Other region-specific infections Strict aseptic protocols are followed to prevent contamination.

V. Skin Harvesting and Processing

Methods of Skin Preservation in Defence Skin Banks

Method	Storage	Advantages	Limitations
Cryopreservation	−80°C	Long shelf life, good graft quality	High cost, cold chain
Glycerol preservation	4–8°C	Reduced immunogenicity, easier storage	Shorter shelf life

5.1 Harvesting Technique

- Performed within 6–12 hours of death (depending on refrigeration)
- Common donor sites: thighs, back, and buttocks
- Harvesting using dermatome under sterile conditions

5.2 Processing and Preservation

- Cleaning and antibiotic soaking
- Meshing if required
- Preservation methods:
    - Cryopreservation at −80°C
    - Glycerol preservation

Each method has advantages in terms of storage life, immunogenicity, and availability.

VI. Clinical Applications in Defence Services

Figure: Workflow of skin banking in defence services – donor identification, harvesting, processing, storage, and clinical application.

6.1 Temporary Wound Coverage

Cadaveric skin allograft: - Reduces fluid loss - Decreases pain - Prevents infection - Promotes granulation tissue

6.2 Bridge to Autografting

Allografts serve as a temporary cover until the patient is stable and sufficient autologous skin becomes available.

6.3 Use in Mass Casualty and Disaster Situations

Skin banks are critical during: - Wartime burn casualties - Terrorist attacks - Industrial and natural disasters

VII. Advantages of Skin Banks for Defence Services

Advantages of Skin Banking in Defence Medical Services

Aspect	Benefit
Clinical	Improved survival, infection control, pain reduction
Operational	Rapid response in combat and mass casualty situations
Strategic	Self-reliance during war and disasters
Training & Research	Platform for burn research and skill development

- Improved survival in major burns
- Reduced hospital stay and complications
- Enhanced preparedness for large-scale emergencies
- Training and research opportunities in military medicine

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- Ability to support civilian healthcare during crises

VIII. Ethical, Legal, and Logistical Considerations

8.1 Ethical Issues

- Respect for donor dignity
- Transparent consent process
- Non-commercialization of human tissue

8.2 Legal Framework

Skin banking must comply with national tissue and organ transplantation laws, biosafety regulations, and defence medical protocols.

8.3 Logistics and Supply Chain

- Cold chain maintenance
- Inventory management
- Rapid distribution to field hospitals

IX. Challenges and Limitations

- Limited public awareness and donor availability
- Risk of infection transmission
- Cost of infrastructure and maintenance
- Need for trained manpower

X. Future Directions

- Development of regional and mobile skin banks for defence forces
- Integration with bioengineered skin substitutes
- Improved preservation techniques to extend shelf life
- Enhanced civil–military collaboration
- Research into immunomodulation and tissue engineering

XI. Conclusion

A skin bank is an indispensable component of modern defence medical services. By ensuring timely availability of cadaveric skin allografts, skin banks significantly improve burn care outcomes and enhance operational readiness. Establishing and strengthening skin banks within defence services not only saves lives during military operations but also contributes to national disaster response capabilities. Continued investment, research, and ethical practice are essential for maximizing their potential.

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