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Introduction

Burns are devastating injuries, often resulting in significant morbidity, impairment of emotional well-being, and quality of life. Burns are a global public health problem, with an estimated 180,000 deaths annually. The majority of these deaths occur in low- and middle-income countries and almost two-thirds occur in the WHO African and South-East Asia regions.

Major burns are often associated with early and long-term complications and usually require a prolonged hospital stay. Treatment for major burns can be challenging but the results may be unsatisfactory with the patients usually suffering lifelong disabilities and having to undergo long-term treatment with multiple outpatient visits as well as multiple reconstructive surgical procedures. Early burn excision and immediate grafting are described as the optimal management for acute burn injury and was shown to be a major cause mortality reduction in major burn patients.

Autografting remains the golden standard of wound covering after debridement but it is limited by feasibility and availability of autograft skin. Various skin substitutes are currently available for temporary wound coverage, and allograft skin is one of the most used materials. Human skin allograft is derived from human cadaver donors and its use and demand have increased rapidly since previous decades. However, the use of human skin allografts is severely hindered by a number of difficulties including inadequate availability, graft rejection, the possibility of disease transmission, and reliance on the tissue banks.

Hence, this technology review was requested by the Head of the Department of Plastic and Reconstructive Surgery, Hospital Sungai Buloh to assess the evidence and feasibility of using human skin allograft in the management of burns.

Objective/Aim

The objective of this technology review is to evaluate the effectiveness, safety, organisational and economic implications of the use of human skin allograft in burns.

Methods

A comprehensive search was conducted on the following databases without any restriction on publication language and publication status. The Ovid interface: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily 1946 to Jan 9, 2023. Searches were also run in PubMed and INAHTA databases. Google was used to search for additional web-based materials and information. Additional articles were identified by reviewing the references of retrieved articles. The last search was conducted on 9th January 2023

Results and Conclusions**Search results**

A total of 245 records were identified through the Ovid interface and PubMed while nine were identified from references of retrieved articles. No duplicate references were found; 254 potentially relevant titles were screened using the inclusion and exclusion criteria. Of these, 23 relevant abstracts were retrieved in full text. After reading, appraising, and applying the inclusion and exclusion criteria to the 23 full-

text articles, 15 were included while the other eight were excluded since the studies were already included in one systematic review (SR), irrelevant population (cases with ulcers), and irrelevant outcome. All full-text articles finally selected for this review were one systematic review and meta-analysis, three case-control studies, nine cross-sectional studies, one cost-utility analysis, and one cost-analysis.

Effectiveness

There was very limited retrievable evidence showing that the use of human skin allograft was associated with significantly higher patient survival and lower likelihood of death in patients with major burns of >50% TBSA. Very limited evidence showed that its use in burn patients of >30% TBSA was associated with significantly lower 90-day inpatient mortality. There was very limited evidence showing that the use of human skin allograft had better wound healing and graft take percentage in burn patients however the difference did not reach statistical significance. Some evidence showed its use was associated with a significantly shorter hospital stay in patients with less severe burns but significantly longer hospitalisation in patients with more severe burns.

Safety

Based on limited available evidence, the use of human skin allograft for burns appeared to be safe. The use of human skin allograft was approved and regulated through tissue banks in the USA by United States Food and Drug Administration (USFDA). Although very limited evidence showed increased inpatient complications with the use of human skin allograft for burn patients, the complications reported were related to diagnosis in five domains including hospital-acquired pneumonia, sepsis, venous thromboembolic disease, peri-procedural bleeding, and postoperative wound complications, which were not directly related to the use of human skin allograft.

Organisational

Limited number of skin banks were established in several developing countries. A sustainable skin banking model by National Burns Centre in India along with Rotary International and Euro Skin Bank outlined four aspects in establishing a skin bank; the finance of setting-up and running a skin bank, the technical assistance in terms of preservation techniques of skin allograft, the procurement, processing, preservation and distribution of skin allograft, and the continuous large-scale skin donation awareness campaign programme for the public. In addition, all skin banks are regulated, and many are accredited according to country or region. In Asia Pacific region, Asia Pacific Burn Association Guidelines for Skin Banking in Therapeutic Applications 2020, offer a comprehensive manual that addresses governance and contracts, staff responsibilities, quality management; facilities, equipment and supplies management, donor consent and testing, and recommendations of good practices related to skin recovery, processing, storage, and distribution of human skin allograft.

Economic implication

Very limited evidence showed that the use of human skin allograft for partial thickness burn of 20% TBSA had an incremental cost-utility ratio of [REDACTED] compared to [REDACTED] compared to SSD, which was considered cost-effective with willingness-to-pay thresholds of

██████████ Limited evidence also showed that the use of human skin allograft in burns was associated with higher cost compared to other skin substitute ██████████

Conclusion

Based on the review, highly limited evidence found that the use of human skin allograft may be effective in terms of patient survival and inpatient mortality for patients with major burns. Its use was considered safe through the pathway of the skin bank. Very limited evidence showed its use for burn patients was associated with higher cost compared to other skin substitutes but can be cost-effective depending on the willingness-to-pay thresholds.