

S1 Text: Reviews of the analysed interventions.

Silver sulphadiazine (SSD) [1–12] contains a unique sulphonamide component that does not inhibit folic acid synthesis, suggesting that the silver ion content mainly causes its antibacterial qualities. The ionic silver released from SSD only has limited eschar penetration; thus, they act superficially. SSD's precise bactericidal mechanism of action is still unknown. However, it may damage DNA replication and increase cell wall permeability through the direct alteration of the membrane and via the production of free radicals. Wounds can be treated while open (SSD only) or closed with the addition of gauze dressings [13].

DuoDERM® [14,15] (ConvaTec Group PLC, Reading, England) is an opaque, biodegradable, and breathable occlusive hydrocolloid dressing that can be worn for up to seven days. It has an outer film that provides an impermeable barrier and a foam layer designed for thermal and mechanical protection. Additionally, it contains an inner honeycomb matrix of hydrocolloid compounds that absorb exudate to form a soft, moist gel [16].

Mepitel® [8,9,17–20] (Mölnlycke Health Care, Gothenburg, Sweden) is a semi-transparent, low-adherent, porous wound contact layer that comprises an elastic polyamide net covered with silicone and contains no biological compounds. The silicone coating is slightly adhesive, which helps it to be applied to the peri-wound area and also aids in retention and removal. By inhibiting the lateral movement of the exudate, it prevents the maceration of the surrounding skin. Mepitel is non-absorptive but contains 1mm diameter pores that allow wound fluids to permeate into a secondary absorbent dressing [21].

SilvaSorb® [10] (Medline Industries, Mundelein, IL, USA) is a biocompatible transparent, amorphous hydrogel with a distinctive microlattice arrangement in which the scaffolding stabilises the silver ions. The dressing exerts its action for three days; therefore, daily dressing changes are not needed. The hydrogel is non-irritating or sensitising and has exceptional fluid management without being toxic to host cells or causing wound staining or pseudoeschar development [22].

Modern **silver-foam** dressings (Acticoat, Aquacel Ag, Mepilex Ag) combine the antibacterial traits of SSD with an improved mechanical barrier and absorption functions. These treatments vary significantly in their total silver concentration, ion release patterns, and therapeutic mechanism of action [22,23].

Acticoat™ [11,17–20,24,25] (Smith and Nephew, St. Petersburg, FL, USA) is a dual-layered dressing with a nanocrystalline silver coat and a polyethylene layer that is bonded to a polyester core, slowly releasing small amounts of silver in an ionised form due to the humid environment. Nanocrystalline ionic silver interrupts bacterial and fungal DNA and protein synthesis. It may also disrupt the biofilm and cell wall structures although in vitro studies suggest that it might be cytotoxic to keratinocytes. Adherence to wound beds was also noted, causing potential skin-stripping and pain upon removal [26].

Aquacel® Ag [2,25] (ConvaTec Group PLC, Reading, England) is a comfortable triple-layered Hydrofiber® dressing. It contains a layer of sodium carboxymethylcellulose that forms a gel on contact with wound fluid, and it also contains antimicrobial 1.2% w/w ionic silver. The middle foam layer absorbs the wound exudate that contains the infective agents. Then, the silver exerts its bactericidal action in the fabric of the dressing without releasing the ions. Therefore, it eliminates the potential for argyria. The top sheet is water-repellent and has controlled vapour permeability and additional protection against microorganisms [27,28]. A study found that optimally, dressings should only be changed every ten days, but this approach may rarely conceal an infection due to its non-transparent design [29].

Mepilex® Ag [17–19,30,31] (Mölnlycke Health Care, Gothenburg, Sweden) consists of two layers: a soft silicone wound contact layer (Safetac®) and an absorbent polyurethane foam layer. The foam sheet contains silver and activated carbon. Dressings made from silicone adhere to intact skin and remain on the wound surface without sticking to it in situ, consequently sustaining a moist milieu and resulting in less traumatic separation [32].

Radiation-sterilised **amniotic membrane (AM)** [5,33,34] allografts are biological skin substitutes and burn dressings. The human placenta's inner amnion layer is shiny and thin and is made up of cuboidal, compact epithelial cells and mesenchymal connective tissue. The thick outer chorion of the fetal membrane is composed of transitional epithelium. The placenta can be used in toto (amnion and chorion) on deep burns, or the amnion can be used alone on superficial wounds. It has low immunogenicity and contains many bioactive factors, such as collagen, cell adhesion compounds (laminins, fibronectin, proteo-, and glycosaminoglycans), and growth factors and cytokines with anti-inflammatory -bacterial, -immunogenic, and -fibrotic features [35,36].

Xenografts are temporary skin substitutes that are derived from animal or plant cells and tissues. A widely used example in tropical and subtropical regions is the **Nile tilapia** [1] (*Oreochromis niloticus*), which originates from the East African Nile River basin. Tilapia has a non-infectious microbiome and morphological composition that is comparable to the human skin but that has more beneficial type I collagen [37].

Biosynthetic dressings (Biobrane, EzDerm, Transcyte) contain cells or particles that originate from living organisms that have been combined or modified with modern synthetic compounds[38].

Biobrane™ [3,6,7,11,14,15,24] (Dow Hickman/ Bertek Pharmaceuticals, Sugarland, TX, USA) is a biosynthetic, bi-laminate dressing. Its made of a flexible, woven, non-biodegradable tri-filament nylon mesh with peptides derived from porcine type I collagen that have been embedded into an ultra-thin, semipermeable silicone outer film. The dressing is able to adhere firmly to the wound and spontaneously detaches when re-epithelialisation has occurred but has deficits in terms of conformability and handling; thus, it is not ideal for burns on the face and neck region. Furthermore, it does not have any specific antimicrobial qualities [39].

Ezderm® [31,32,40] (Mölnlycke Health Care, Gothenburg, Sweden) is a perforated, biosynthetic porcine xenograft that is pre-meshed at a ratio of 1:1. The collagen in this dressing

has been crosslinked with aldehydes to provide strength and durability. They can be used as a diagnostic tool for deep or infected burns, as they tend not to adhere to them, unlike superficial ones. Nevertheless, some studies have reported increased hypertrophic scarring, which is probably due to an immune response against the biological components of the dressing. Furthermore, there are cultural and ethical aspects of using pig donors and a possibility for viral transmission [41].

TransCyte® [6] (Advanced Tissue Sciences, La Jolla, CA, USA) is a translucent, temporary biosynthetic skin substitute that consists of a polymer silicone membrane bonded to a nylon mesh coated with porcine dermal collagen and neonatal human fibroblast cells cultured on that mesh in vitro. These fibroblasts secrete human dermal collagen matrix proteins and growth factors. Following freezing, the tissue matrix and growth factors are left intact when there is no metabolic activity, and after application, these particles facilitate healing until wound closure occurs [42].

ReCell® [15] (Avita Medical Ltd, Cambridge, UK) is a device that processes autologous skin samples that have been collected in an operating theatre into a suspension using a trypsin solution. Later, this solution can be applied to the wound using its Spray-On Skin system, showing comparable results to split-thickness skin grafting. ReCell can be combined with traditional dressings that may further improve patient outcomes, but the available information is controversial [43].

Adjunctive therapies (**collagenase**, **vitamin E+C+Zinc**, **wIRA**, **NPWT**, **heparin**, **rhGM-CSF**, **bFGF**, and **rhEGF**) are physical or chemical enhancers of tissue regeneration that can be added to traditional occlusive dressings to improve patient outcomes.

Collagenase [4] (Santyl® - Healthpoint Biotherapeutics, Fort Worth, TX, USA) ointment is an enzymatic debridement agent (similar to bromelain or papain [44]) that cleaves denatured collagen at seven specific sites and that creates bioactive peptides as byproducts. These particles can stimulate keratinocytes and fibroblasts, induce endothelial cell migration, and are related to the proliferative phase of reepithelialisation. It can be combined with antimicrobial agents (e.g., nystatin and polymyxin b (PMB)) to form a therapy on its own, but adding this protein to other occlusive dressings may improve outcomes, but this has yet to be investigated in children [45].

Recombinant human epidermal growth factor (rhEGF) [46] is a protein that is responsible for stimulating cellular proliferation, differentiation, and survival by binding to its receptor (EGFR)[47].

Basic fibroblast growth factors (bFGF) [48] (Trafermin, Fiblast Spray®, Kaken Pharmaceutical, Tokyo, Japan) are cell signalling proteins that have been pre-synthesised by macrophages and released at the injury site. They are often referred to as pluripotent growth factors due to their multiple types of action on many cell types, such as improving angiogenesis and keratinocyte organization [49].

Recombinant human granulocyte-macrophage colony-stimulating factor (rhGM-CSF) [50] is a monomeric glycoprotein that is secreted by many cells in the immune system

and that functions as a pro-inflammatory cytokine against infections. However, it also increases oedema and reactive oxygen production [51].

Heparin [52] is a naturally occurring glycosaminoglycan and anticoagulant medication that is released from mast cells directly into the vasculature. Its exact mechanism of action is unknown, but it has been proposed that its primary function is defence against foreign materials. Several side effects have been noted, including bleeding, heparin-induced thrombocytopenia, hyperkalaemia, and elevated liver enzymes. Fortunately, its impact can be counterbalanced with protamine–sulphate [53].

Vitamins E and C Supplemented with Zinc [54] have been administered due to their antioxidant traits, which may reduce the consequences of the pro-inflammatory cytokines after trauma. Moreover, vitamin C plays a vital role in collagen synthesis, and zinc is an essential part of more than 1000 transcription factors and 300 enzymes from every class [55–57].

Negative pressure wound therapy (NPWT) [12,20,58] is a non-invasive treatment that involves the controlled application of subatmospheric pressure to the wound using a dressing sealed with a transparent film connected to a vacuum pump to remove excess exudate and to promote circulation. Therefore, it creates a moist environment with reduced oedema, but it can only be used where there are no exposed blood vessels or nerves because direct foam contact may damage them [59].

Water-filtered infrared-A (wIRA) [60] produces a therapeutic heat field in the tissue created from full-spectrum light purified by a hermetically sealed water filter that blocks out all of the harmful ultraviolet light waves. Therefore, wIRA increases tissue temperature, oxygen partial pressure, and perfusion, improving energy and oxygen supply. Furthermore, it can reduce inflammation and hypersecretion as well as the need for analgesics [61].

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