International Wound Infection Institute

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Table 11: Antiseptics (medicated and non-medicated) commonly used in wound treatment

Solution	*In vitro*/bench research	Uses in wound treatment			Comments
		Cleanse/ irrigate	Topical	BBWC	
Alginogel	• Broad spectrum activity against Gram-negative and Gram-positive bacteria.[1] • Prevents biofilm formation at ≤0.5% concentration.[2] • Inhibits established biofilm growth at concentrations >0.5%.[2]		✓		• Alginate gel with two enzymes: lactoperoxidase and glucose oxidase.[3] • Available in 3% and 5% concentration, selection based on wound exudate levels.[2, 3] • Not toxic to keratinocytes or fibroblasts.[1]
Concentrated surfactant gels (e.g. PMM surfactant)	• Active against *P. aeruginosa, Enterococcus spp., S. epidermidis, S. aureus* and methicillin-resistant *S. aureus* (MRSA) biofilms.[4]	✓	✓	✓	• Poloxamer-based surfactant that forms a gel when it warms on tissue.[4]
Copper (Metallic copper, cupric oxide and cuprous oxide nanoparticles)	• Activity against Gram-negative and Gram-positive bacteria including *S. aureus*, *P. aeruginosa*, *E. coli.* and MRSA in *in vitro* models.[5-7]		✓		• Available as a surfactant and impregnated in dressings.[5, 7] • Toxic to human cells, although toxicity is lower with nanoparticle preparations.[5, 7]
Dialkyl carbamoyl chloride (DACC)	• Capacity to bind with a range of bacteria including *S. aureus* and MRSA,[8] without further bacterial replication.[9] • Capacity to bind with *P aeruginosa*, *S. aureus, S. epidermidis* and MRSA biofilms.[9, 10]		✓	✓	• A dressing with fibres covered in a hydrophobic derivative of fatty acids; bacteria bind to the dressing and are removed with dressing change.[10-13] • Antimicrobial effect is achieved by mechanical characteristics.[10-12]
Honey (Medical grade)	• Effective against Gram-positive and Gram-negative bacteria including *E. coli, P. aeruginosa, S. aureus*, *Acinetobacter*, *Stenotrophomonas*, MRSA and vancomycin-resistant enterococci (VRE).[14-17] • Inhibits biofilm activity, including *Pseudomonas* biofilms.[18-21]	✓	✓	✓	• Acidic, hyperosmolar sugar solution available as paste or dressings (e.g., hydrocolloids, alginates, tulle).[14, 22] • Antimicrobial effect relates to production of hydrogen peroxide by an enzyme within honey.[14] • Promotes autolytic debridement.[22, 23] • Select products that have been gamma irradiated.[21]
Iodophors (Povidone iodine)	• Broad spectrum activity against Gram-negative and Gram-positive bacteria, fungi, spores, protozoa and viruses.[24-28] • Penetrate and disrupt biofilms, including *P. aeruginosa* and *S. aureus* biofilms at 1% concentration.[24, 26] • Eradicates *S aureus*, *K. pneumoniae*, *P. aeruginosa* and *C albicans* biofilms at 0.25% concentration.[26, 27]	✓	✓	✓	• Halogen antimicrobial[24] available as ointment, gel, liquid, surfactant and wound dressing.[25] • Has additional anti-inflammatory effects.[24, 26, 29] • No reports of bacterial or cross resistance.[24, 26, 27] • Dose dependent cytotoxic effect on osteoblasts, myoblasts and fibroblasts.[24, 30] • Rapid release formulas may require 2-3 daily application for optimal effect.[24] • Contraindicated in neonates, iodine sensitivity, thyroid or renal disorders and large burns.[24, 25]
Iodophors (Cadexomer iodine)	• Broad spectrum activity against Gram-negative and Gram-positive bacteria, fungi, spores, protozoa and viruses.[24] • Reduces microbial burden complicated by biofilm at 0.9% concentration.[31]		✓	✓	• Halogen antimicrobial[24] available as powder, paste, solution and wound dressings.[32] • Dose dependent cytotoxic effect on keratocytes and fibroblasts.[24] • Contraindicated in children below 12 years, iodine sensitivity, thyroid or renal disorders and extensive burns.[24]

Table 11: Antiseptics (medicated and non-medicated) commonly used in wound treatment					
Solution	***In vitro*/bench research**	**Uses in wound treatment**			**Comments**
		Cleanse/ irrigate	**Topical**	**BBWC**	
Iodophors (Poly-vinyl alcohol [PVA]-based foam	• Broad spectrum activity against Gram-negative and Gram-positive bacteria, fungi, spores, protozoa and viruses.[24] • Active against *P. aeruginosa* and *S. aureus* biofilms.[24]		✓	✓	• Halogen antimicrobial[24] available as dressing. • Low level of cytotoxicity for most products[24, 33] • Dose dependent toxicity has been observed with iodine impregnated foam dressing.[34]
Octenidine dihydro-chloride (OCT)	• Broad spectrum action against Gram-positive and Gram-negative bacteria, MRSA and fungi.[35-42] • Eradicates bacterial biofilm[43, 44] for up to 72 hours.[35]	✓	✓	✓	• Available in gel, irrigation and surfactant preparations.[45] • Does not promote bacterial resistance. • Good tissue tolerability has been demonstrated;[46, 47] not shown to disrupt healing.[45] • Anaphylaxis and allergic response rarely observed.[48, 49]
Polyhexa-methylene biguanide (PHMB)	• Efficacious against Gram-positive bacteria, Gram-negative bacteria, fungi and viruses.[26, 27, 32, 43, 50] • Effective against *P. aeruginosa*, *S. aureus*, MRSA and mixed species biofilms.[26, 32, 43, 50-53]	✓	✓	✓	• Available in gel, irrigation and surfactant preparations. • Does not promote bacterial resistance.[22, 26, 27] • Low cytotoxicity *in vitro*.[50] • Eczema or anaphylaxis rarely observed.[50]
Silver (Salts and compounds, including sulphadiazine, oxides, phosphate, sulphates and chlorides)	• Concentration dependent effect in eradicating mature *P. aeruginosa* and *S. aureus* biofilm.[26, 54] • Reduce bacterial loads complicated by biofilm.[32] • Silver dressings/slow-release ions have broad spectrum activity,[55] including against MRSA and VRE.[25]		✓		• Available as ointment, gel and wound dressing. • Dose and time dependent cytotoxic effects on human fibroblasts, keratinocytes and endothelial cells,[26] may delay epithelialisation.[25] • Microbial resistance appears uncommon[25, 55] but has been reported for some isolates.[11, 56]
Silver: (Elemental [metal and nano-crystalline])	• Broad spectrum activity against Gram-negative and Gram-positive bacteria,[57, 58] including *P. aeruginosa*, *E. coli* and *S. aureus*.[58] • Inhibit biofilm formation.[57]		✓		• Available as wound dressings • No[58] or mild[59] concentration-dependant cytotoxic effect on fibroblasts.
Silver with anti-biofilm mechanisms	• Broad-spectrum antimicrobial action.[60] • Prevents biofilm formation.[60, 61]		✓	✓	• Available as 1.2% ionic silver impregnated dressing enhanced with EDTA (a chelating agent with its own broad spectrum antimicrobial and antibiofilm activity[62]) and benzethonium chloride (BEC; a surfactant)[60, 61, 63]
Super-oxidised solutions (Sodium hypochlorite [NaOCl] antimicrobial preservative)	• Eradicates *P. aeruginosa* and MRSA,[51] but has a time dependent response.[64]	✓	✓		• Available in alginate, irrigation and surfactant preparations. • Naturally occurring oxidising antiseptic,[65] sometimes available as a blend with hypochlorous acid (HOCl).[66] • Dose and time dependent cytotoxicity to keratinocytes and fibroblasts;[64] older preparations (e.g., traditional 0.4-0.5% Dakin's solution) have high tissue cytotoxicity.[66]
Super-oxidised solutions: (Hypochlorous acid (HOCl) antimicrobial preservative)	• Broad spectrum action against bacteria, virus and fungi, including MRSA.[51, 65] • Eradicates bacterial and fungal biofilms.[51, 67]	✓	✓	✓	• Available in irrigation and surfactant preparations and as an antimicrobial preserved wound cleanser.[66] • [65]Sometimes available as a blend with NaOCl.[66] • Has an anti-inflammatory effect through reducing activity of histamines, matrix metalloproteinases mast cell and cytokine activity.[65] • Dose dependent cytotoxicity, but non-cytotoxic at concentrations that achieve antimicrobial action.[66]

Table 11 References

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