Wound care & Antimicrobial Resistance (AMR)

What is AMR? [1,2,3]

Antimicrobial resistance (AMR) occurs when microorganisms evolve to the point where they no longer respond to any antimicrobial treatments[1]. Inappropriate and overuse of antimicrobial products has contributed to the rise in AMR[2] and, over time, this misuse allows resistant bacteria to thrive, pass on their resistance to other bacteria, and can ultimately render standard treatments ineffective[3]. As AMR becomes more prelevant, common infections will become more dangerous and medical procedures like surgeries, will become significantly riskier.

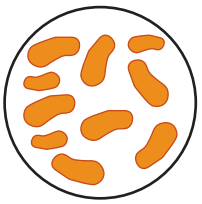
Topical antimicrobial products used in wound care

Antibiotics	Antiseptics	Other anti microbial products
e.g. fusidic acid, silver sulfadiazine, ...	e.g. povidone-iodine, chlorhexidine, ...	e.g. GLG-enzyme system (Flaminal®)

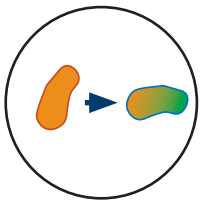
How does AMR take place? [2,3,4]

Some microorganisms have natural genetic differences that make them resistant to antibiotics.

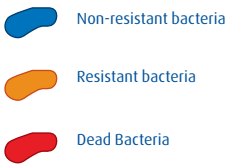
Antimicrobial agents will be able to kill bacteria without genes for resistance, but the resistant bacteria will survive.



Repeated exposure to antimicrobial agents, especially from overuse or misuse, selects for these resistant strains.



Resistant bacteria can share genes for resistance with other bacteria[5]. Over time, the resistant strains become more common.

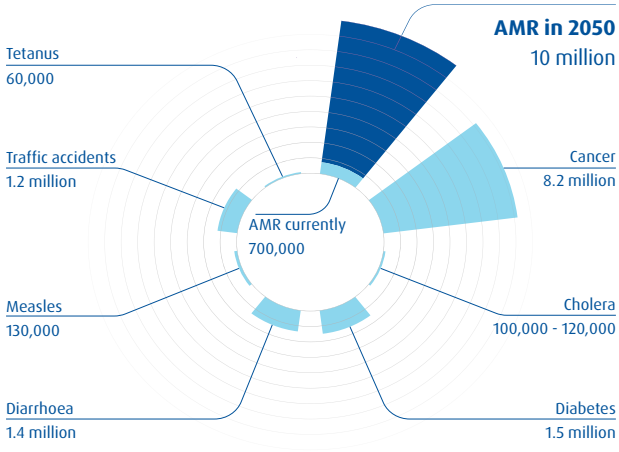


AMR: a global problem[5]

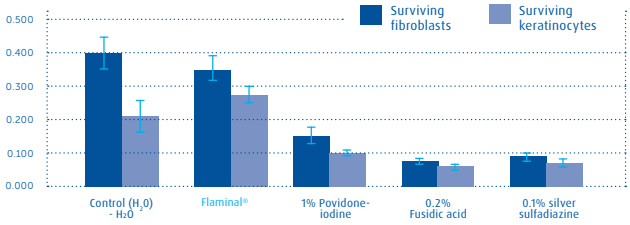
Chronic wounds are a major problem for healthcare organisations worldwide. Everyone has a responsibility to be aware of AMR and undertake antimicrobial stewardship, by following evidence-based guidelines for prescribing and administering antimicrobials.

By **2050**, antimicrobial drug-resistant diseases could cause **10 million deaths annually** and cost **£66 trillion** if no action is taken.

Compared to other major causes of death, the estimated annual deaths attributable to AMR will increase to 10 million.



Non-cytotoxic: safe for healthy skin cells and wound tissue



As well as offering **antimicrobial protection, Flaminal® is non cytotoxic,** and can therefore be used during **all stages of the wound healing** process. **Non-cytotoxicity is crucial in wound care** as it ensures that treatments do not damage **healthy cells necessary for healing, such as fibroblasts and keratinocytes and preservesing the integrity of the wound bed.**

References

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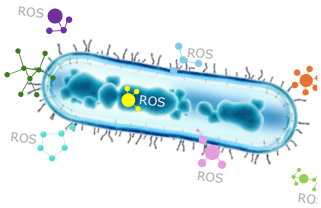
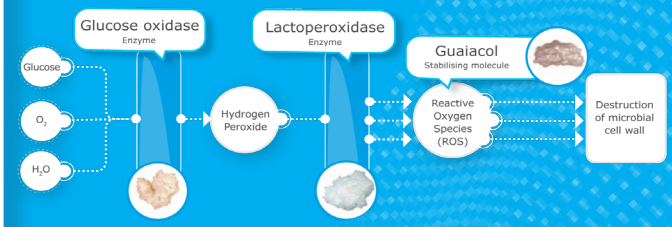
Flaminal® provides antimicrobial protection

The mode of action of Flaminal® Hydro and Forte[6]

The **GLG system**, present in both **Flaminal® Hydro and Forte**, generates multiple ROS that **act on bacteria and fungi**.

The **ROS have different targets in a bacterial cell**, including **proteins**, **enzymes** and components of the **cell wall**. The **variety of targets** of the ROS in the bacteria cell means it's **much harder for facile resistance to occur**.





The unique antimicrobial GLG enzyme system in Flaminal® protects wounds against infections and, under medical supervision, can be used to treat infected wounds.

Flaminal® is effective against a broad-spectrum of bacteria and fungi[7]

The broad-spectrum antimicrobial activity of the GLG enzyme system in Flaminal® (demonstrated *in vitro*)

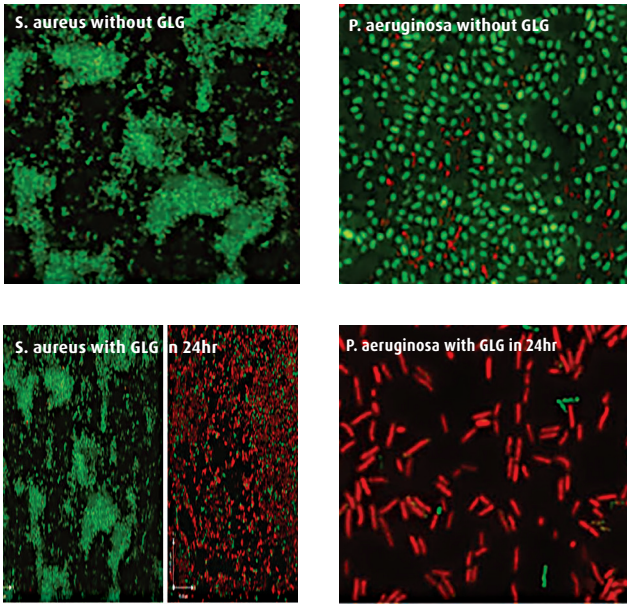
Gram	Bacteria	Killed within 6 hours
+	Staphylococcus aureus (MRSA)	✓
+	Enterococcus faecium	✓
+	Enterococcus faecalis	✓
−	Escherichia coli	✓
−	Klebsiella oxytoca	✓
−	Enterobacter cloacae	✓
−	Enterobacter aerogenes	✓
−	Burkholderia multivorans	✓
−	Pseudomonas aeruginosa	✓
−	Stenotrophomonas maltophilia	✓
−	Pandoraea apista	✓
−	Achromobacter denitrificans	✓
Fungi	Candida albicans	Significant reduction after 24 hours

Minimal risk of development of antimicrobial resistance [9,10,11]

Product Category	Antimicrobial resistance reported to date
GLG enzyme system (Flaminal®)	No
Topical antibiotic	Yes
Topical antiseptic	Yes

Microorganisms are first absorbed into the gel matrix by the alginate present in Flaminal®, and then killed by the GLG system (demonstrated *in vitro*)[12]

Green = viable bacteria
Red = dead bacteria



Case study: Flaminal® in the treatment of an infected ulcer

Read the full case study here

Natalie Harper, Practice Nurse, Medical Practice Crumlin, Northern Ireland

- ✓ Successful debridement
- ✓ Exudate management
- ✓ Odour control
- ✓ Infection prevention

Both Flaminal® Hydro and Flaminal® Forte contain the same antimicrobial enzyme system and can both be used to treated infected wounds, under medical supervision.

Complete wound closure in approximately 21 weeks

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