1.3 System for On-Site Production of Wound Irrigation Solution

MEDICAL ISSUE

On-site Production of Wound Irrigation Solutions

The Technology and the specifically designed equipment allow for need-based and cost effective on-site manufacture of high quality wound irrigation solutions for decontamination, control of infections and stimulation of wound healing in accordance with modern standards for moist wound treatment.

Wound Irrigation Solutions for Modern Treatment Standards

The Technology provides means for topical treatment of wounds and infections meeting modern standards of wound management, such as wound irrigation, moistening and moisture of wounds. Users are provided with the possibility to manufacture their own solution for wound irrigation and wound moisture in a basic and cost effective way.

Due to the specific properties of the solutions moist wound treatment conditions can be implemented in combination with simple and cost-effective wound dressing materials (e.g. cotton swabs and cotton compresses).

IMPLEMENTATION

Equipment

The production devices are designed for decentralized and on demand manufacture of the solutions from basic source materials (demineralized water and sodium chloride) using advanced diaphragm-electrolysis-technology.

Operational requirements:

- Water
demineralized (or distilled, if available)
- Salt
max. 2.0 g per liter
- Electric power
power supply: 100-240 V AC or 24 V DC;
max. 300 W.

Device Specifications:

- Total weight: 18 kg
- Dimensions: 41.5 x 33.0 x 51.5 cm
- Automatic controls

Production Technology

The basic technical process of the Technology is based on diaphragm-electrolysis (a special form of electrolysis). The technical procedure is called electro-chemical activation.

Production of 1 liter Anode or Anode Neutral solutions (concentrate) takes 12 minutes. Diluted with water to a maximum concentration of 30% this provides for 3.3 liters of ready for use irrigation solution.

Features of the Technology

- Covers a wide range of applications in a neglected sector of primary health care;
- Can prevent enormous secondary health complications with basic means;
- Shows immediate positive effects on the health situation;
- Requires no programs in preparation;
- Facilitates autonomy in supplies;
- Can be applied by using existing structures;
- Is safe and environmentally compatible.

CE-Certification

The Technology is a quality assured advancement and optimization of existing diaphragm-electrolysis for application in the medical field. The wound irrigation solutions are meeting all requirements for medical application and all relevant EU standards with regard to safety and efficiency of medical devices.

CONTACT INFORMATION

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HEALTH IMPACT

Cleansing and Decontamination of Wounds

The interaction of different, highly reactive oxidants in the fluids leaves no chance for microorganisms. Tests have confirmed that the solutions are effective in decontamination against a wide spectrum of microorganisms.

Decontamination Properties of Anode solution / Anode Neutral Solution

- Staphylococcus aureus
- Multiresistant Staphylococcus aureus (MRSA)
- Escherichia coli
- Pseudomonas aeruginosa
- Legionella pneumophilia
- Candida albicans

Stimulation of Wound Healing / Bioelectrical Effects

Electrical processes are playing a central part in and on wounds ("wound electricity"). Intact, vital skin has endogenous bioelectrical properties. Deeper skin layers are positively, the skin surface is negatively charged.

The charge balancing (short circuit), that occurs in injuries, generates a measurable wound current. Defensive cells, fibroblasts and epithelial cells (Galvano-/Electrotaxis) are attracted and activated. The physiological processes of wound healing - provision and release of mediators and stimulation of blood circulation - in the wound perimeter can be favourably affected and stabilized. However the electrical potential is exhausted in complicated resp. large wounds or extended healing processes. In chronic wounds the wound current ceases almost entirely.

The Anode and Anode Neutral Solutions contain a high density of negative charges. Irrigation, moist swabs or moist dressings contribute to the stabilization resp. renewal of the electrical potential in the wound area, reactivation of the wound current, and optimization wound healing.

Case Study Wound Healing

Patient, 76 years old, Diabetic Foot Syndrome, severe wound healing disorder following amputation of big toe.

Treatment with moist swabs and moist dressings using Anode Solution 30% concentration.

In the diaphragm-electrolysis process, a source solution - demineralized water and a small quantity of highly pure salt - is conducted through the electrolysis cell and exposed to the effect of electric current.

Thereby different processes of chemical and electro-chemical nature are running parallel and generate products, which in comparison to the source solutions show modified physical and chemical properties (electrical conductivity, pH value, ORP, structural composition). Besides different chlorine compounds the solutions contain a high number of ROS (reactive oxygen species) such as oxygen ions, ozone, hydroxide ions and hypochlorous acid and have a high oxidation-reduction-potential.

Due to the specific production process the shelf-life is limited.

Addressed Health Issues

- Wounds
- Burns
- Skin Diseases
- Mucous membranes
- Neonatal / Postnatal Infections

System for On-Site Production of Wound Irrigation Solution

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Immanuel Jacobs

Automation of wound irrigation

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