



Role of Askina Calgitrol Ag in Pressure Ulcer Management

Apirag Chuangsuwanich, MD.
Division of Plastic Surgery
Faculty of Medicine, Siriraj Hospital
Mahidol University

Definition



- Pressure ulcers are any damage to the skin and the underlying tissue or both that results from pressure, friction, or shearing forces that usually occur over bony prominences such as the sacrum or heels.

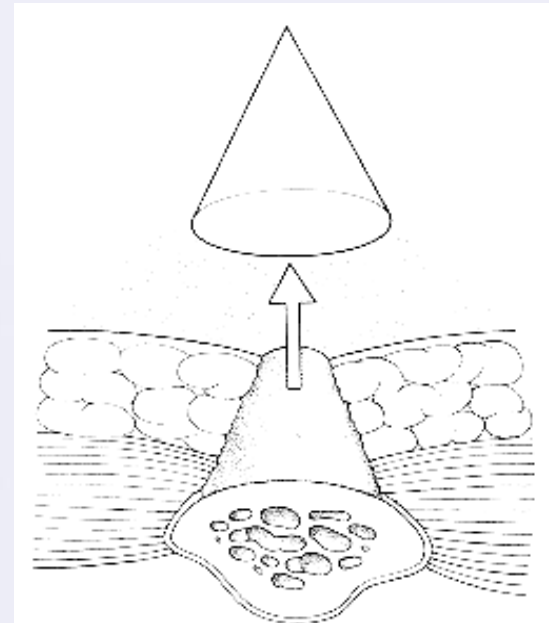


Epidemiology

- **Pressure ulcers** are present in 5-10% of patients in all health care settings
- Almost two thirds of **pressure ulcers** first develop in acute care hospitals.
- 60-70% of these ulcers occur within the first 2 weeks of hospitalization.
- One-year mortality approaches 40%.
- Patients with **pressure ulcers** have increased hospital costs, increased lengths of stay, and increased mortality.

Patho-physiology of Pressure Ulcer

- Pressure at soft tissue over capillary pressure(32 mmHg) for more than 2 hours
- 70mmHg pressure for two hours produces irreversible injury
- Shear force
- Friction force
- Loss of protective sensation
- Loss of mobility



Staging of pressure ulcer

- Stage I
 - represents intact skin with signs of impending ulceration
 - presents as blanchable, erythema indicating reactive hyperemia.
 - Reactive hyperemia should resolve within 24 hours of the relief of pressure.

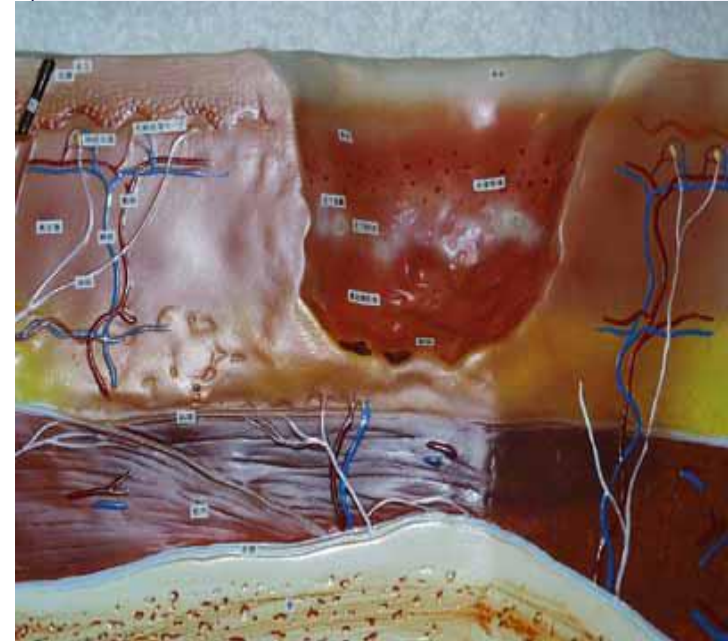


- Stage II
 - represents a partial thickness loss of skin involving epidermis and possibly dermis.
 - This lesion may present as an abrasion, blister, or superficial ulceration.

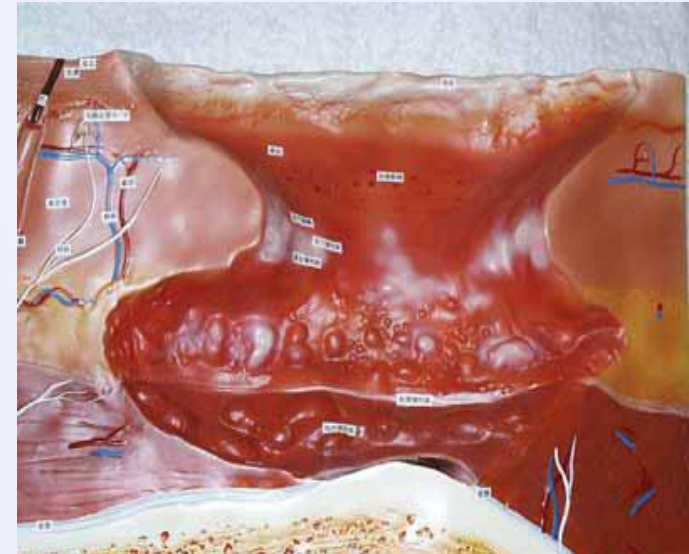


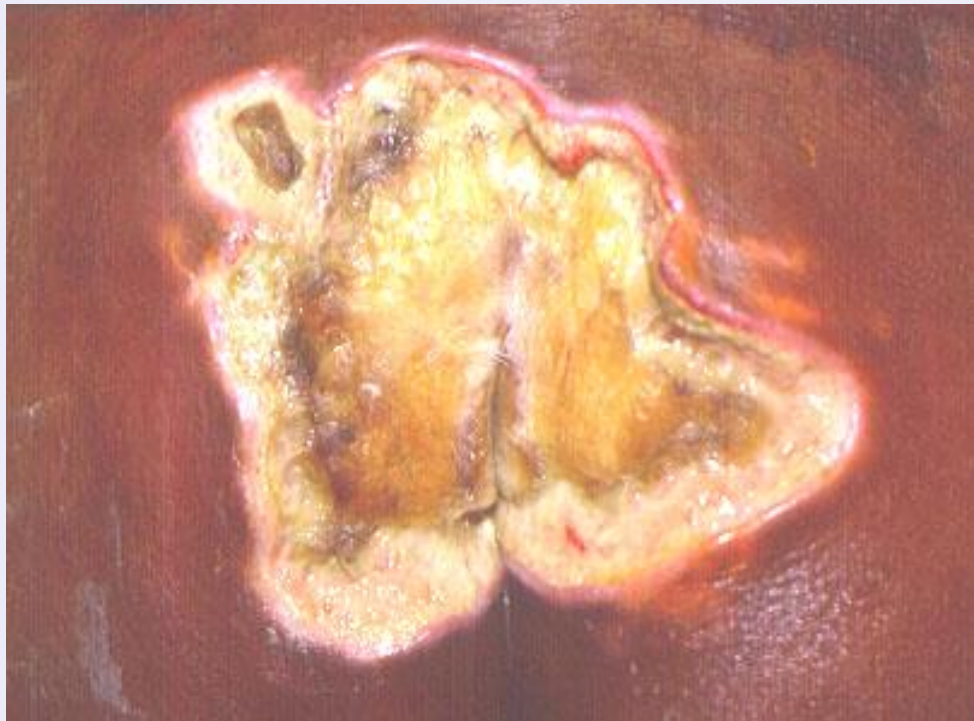
- Stage III

- represents a full thickness loss of skin with extension into subcutaneous tissue but not through the underlying fascia.
- This lesion presents as an ulcer with or without undermining of adjacent tissue.



- Stage IV
 - represents extension into muscle, bone, tendon, or joint capsule.
 - Osteomyelitis with bone destruction and dislocations or pathologic fractures may be present.
 - Sinus tracts and severe undermining commonly are present.





Plan of Pressure Ulcer Care



Evaluation

- Patient condition
- Wound condition
- Sensation condition

Intervention

- Improve general condition
- Wound management
- Rehabilitation (contracture, spasticity, etc.)
- Off loading
- Adjunctive therapy
- Surgery

Prevention

- Education
- Prevention

What are The Objectives of Wound Management



- Control infection
- Control exudate
- Control odor
- Healed wound

Description of Ulcers

- Stage Ulcer
- Location
- Size
- Wound bed
- Granulation tissue

- Necrotic tissue
- Wound edges
- Drainage
- Infection
- Pain

Assessment of pressure ulcer

- Bacteriological study
- X-Ray , arthrogram
- Bone scan
- CT scan, MRI
- Blood chemistry, CBC
- Hemoculture

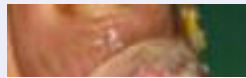
Wound Bed Preparation (TIME)

: The removal of local barriers to healing



T

Tissue: value of repetitive and maintenance debridement and wound cleansing



Infection/inflammation: clinical recognition of infection (and non infective causes of persisting inflammation) is critical



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Moisture: the relevance of excessive or insufficient wound exudate and its molecular components

Edge of wound/epithelial advancement: clearest sign of wound healing



E

Types of Dressings

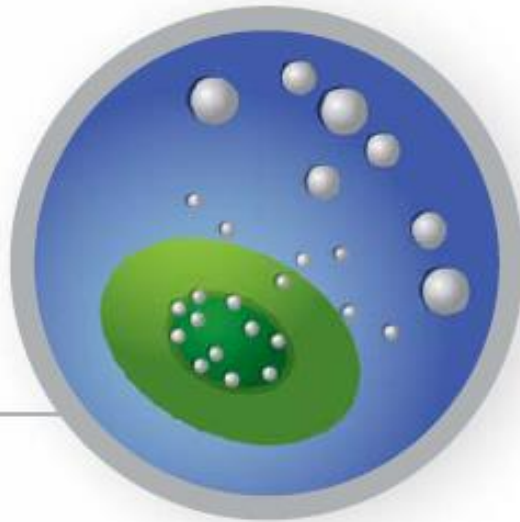


- Gauze
- Transparent films
- Hydrocolloid
- Hydrogel
- Alginates
- Foam
- Composite

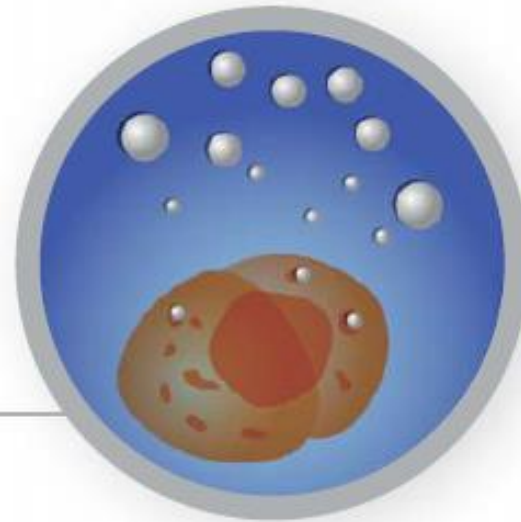
Treatment of Infected Pressure Ulcer

- Infection
 - Bacteremia, sepsis, or cellulitis require systemic antibiotic therapy.
 - Local infection (colonization) does not require systemic antibiotics
 - Local infection is more appropriately treated with topical antibiotics (*not* topical antiseptics).

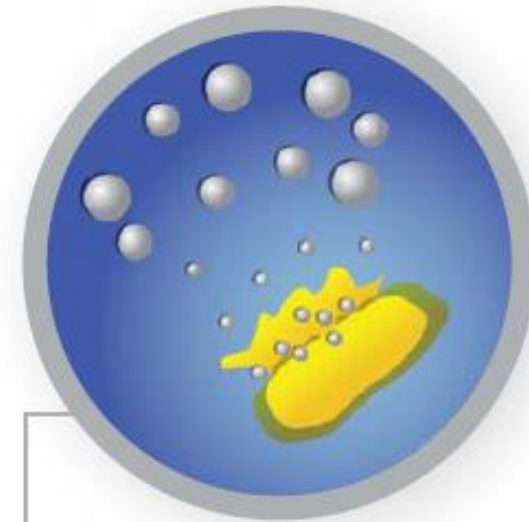
Ionic silver works three ways to control bacteria



The silver ions react with the cell's DNA, prohibiting reproduction.⁶



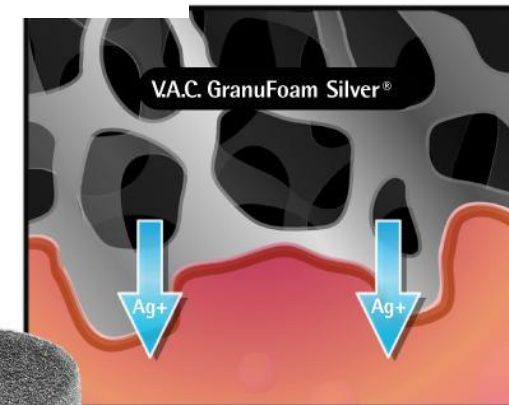
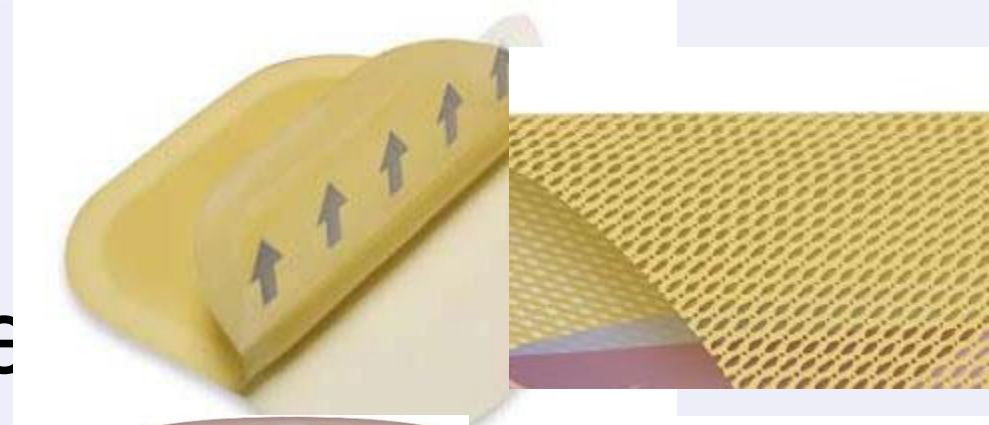
The silver ions enter the cytoplasm and bind with enzymes that control respiration. The enzymes shut down, suffocating the cell.^{7,8,9,10,11}



The silver ions bind to the cell wall, causing lysis.^{12,13}

Forms of Silver for the Control of Wound Infections

- Cream
- Nano-crystalline
- Ag ion



V.A.C. GranuFoam Silver® Dressing provides direct and complete contact with the wound bed for continuous delivery of V.A.C.® Therapy and silver.

Silver Containing Dressings



Problem

- Some argument about advanced wound dressing :
better healing rate
- Overall cost of treatment : expensive
- Study for cost-effectiveness of advanced wound
dressing



A cost and clinical effectiveness analysis among moist wound healing dressings versus traditional methods in home care patients with pressure ulcers

Kyriakos Souliotis, PhD¹; Ioannis Kalemikerakis, MSc²; Maria Saridi, PhD¹; Manto Papageorgiou, MSc³; Athena Kalokerinou, PhD³

1. Faculty of Social and Political Sciences, University of Peloponnese, Corinth, Greece,
2. Department of Nursing, Technological Educational Institute of Athens, Athens, Greece,
3. Department of Public Health Faculty of Nursing, University of Athens, Athens, Greece

Reprint requests:

Maria Saridi, Sina 33 str. Korinthos, Greece.

Tel: +302741361563;

Fax: +302741020529;

Email: sarmar32@windowslive.com

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ABSTRACT

The aim of the study was a cost and clinical effectiveness analysis between moist wound healing dressings and gauze in a homecare set up for the treatment of stage III and IV pressure ulcers up to complete healing. In addition, we assessed the overall economic burden on the Healthcare System. Treatment method for each patient was chosen randomly by using sealed opaque envelopes. The authors monitored the healing progress and recorded treatment costs without interfering with the treatment process. The healing progress was estimated by using surface measurement transparent films. To estimate treatment costs, the

Table 1. Characteristics of the patients that completed the study and days of treatment

	'Moist wound healing dressings' group N = 47	"Plain gauze" group N = 48	p-Value
Men	27	25	0,749*
Women	20	23	0,749*
Age in years (mean ± SD)	75.1 ± 8.6	77.02 ± 8.02	0.260**
Initial ulcer surface in cm ² (mean ± SD)	43.5 ± 30.7	41.52 ± 29.4	0.740**
Total number of treatment days until healing	4,278	6,070	–
Average number of treatment days until healing (mean ± SD)	85.6 ± 52.1	121.4 ± 52.2	0.001**
Total dressing change frequency until healing	2,475	11,130	–
Average dressing change frequency until healing (mean ± SD)	49.5 ± 29.6	222.6 ± 101,9	0.000**

*Chi-square (Yates's correction), 95% CI.

**Student's *t* test 95% CI.

Table 3. Total costs of home treatment that burdens the Insurance funds and the health system

Unit costs	Number of changes until healing		Cost per change (€)		Total cost (€)	
	Dressing <i>N</i> = 47	Gauze <i>N</i> = 48	Dressing <i>N</i> = 47	Gauze <i>N</i> = 48	Dressing <i>N</i> = 47	Gauze <i>N</i> = 48
Dressings (1 pad/change)/sterile gauze 15 × 15 (6 pads/change)	2,475	11,130	10,20	0.90	25,245	10,017
Labor cost	2,475	11,130	13.88	13.88	34,353	154,484
Sterile gauze 15 × 15 for cleansing (3 pads/change)	2,475	11,130	0.45	0.45	1,114	5,008
Saline for cleansing (150 mL/change)	2,475	11,130	0.432	0.432	1,069	4,808
20 mL syringe (1 per change)	2,475	11,130	0.56	0.56	1,386	6,232
Antiseptic solution (20 mL when needed)	120	210	0,167	0,167	20	35
Examination gloves (2 pairs/change)	2,475	11,130	0,144	0,144	356	1,602
Adhesive tape (80 cm/change)	0	11,130	0,4	0,4	0	4,452
Total treatment cost per method until healing (€)					63,543	186,638
Average treatment cost per patient until ulcer healing (€)					1,351	3,888

Cost-Effectiveness Analysis in Comparing Alginate Silver Dressing with Silver Zinc Sulfadiazine Cream in the Treatment of Pressure Ulcers

Apirag Chuangsuwanich, Peerasak Chortrakarnkij, Jupaporn Kangwanpoom

Division of Plastic Surgery, Department of Surgery, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand

Background The treatment of pressure ulcers is complicated, given the various wound dressing products available. The cost of different treatments varies and the cost-effectiveness of each product has not been thoroughly evaluated. We compare two wound dressing protocols—alginate silver dressing (AISD) and silver zinc sulfadiazine cream (AgZnSD) with regard to wound healing and cost-effectiveness

Methods Patients with grade III or IV sacral or trochanteric pressure ulcers were eligible for this prospective, randomized controlled trial. The patients were randomized to receive one of the two dressings for an eight-week period. The criteria of efficacy were based on the Pressure Ulcer Scale for Healing (PUSH) scoring tool. The cost of treatment was also assessed.

Results Twenty patients (12 women and 8 men) were randomly assigned to receive either AISD ($n=10$) or AgZnSD cream ($n=10$). The demographic data and wound characteristics were comparable in the two groups. The two groups showed no significant difference in the reduction of PUSH score, wound size, or volume of exudate. The tissue type score was significantly lower in the AISD group (3.15 ± 0.68 – 1.85 ± 0.68 vs. 2.73 ± 0.79 – 2.2 ± 0.41 ; $P=0.015$). The cost of treatment was significantly lower in the AISD group (377.17 vs. 467.74 USD, respectively; $P<0.0001$).

Conclusions Alginate silver dressing could be effectively used in the treatment of grade III and IV pressure ulcers. It can improve wound tissue characteristics and is cost-effective.

Keywords Pressure ulcer / Calcium alginate / Cost effectiveness

Correspondence:

Peerasak Chortrakarnkij
Division of Plastic Surgery,
Department of Surgery, Faculty of
Medicine, Siriraj Hospital,
2 Prannok road, Siriraj, Bangkok-noi,
Bangkok, Thailand 10700
Tel: +66-24198002
Fax: +66-24128109
E-mail: peerasak.si.plastic@gmail.
com

This article was presented as a poster at the European Wound Management Association (EWMA) on May 25-27, 2011 in Brussels, Belgium.

The Askina Calgitrol Ag product used in this study was donated by B Braun, Co., Ltd. of Thailand.

No potential conflict of interest relevant to this article was reported.

Silver Zinc Sulfadiazine Cream

- Conventional treatment
- Good result over 20 years
- Antimicrobial activity
- Cheap price
- Film-like layer : pseudoeschar
- Change dressing 1-2 time(s) daily



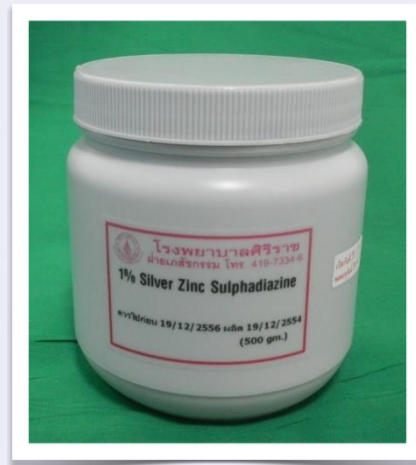
Alginate Silver Dressing

- Askina Calgitrol Ag®
- Advanced wound dressing
- Polyurethane foam and alginate matrix with silver ions
- Combine absorptive and antimicrobial properties
- More expensive
- Left in place for 3-5 days

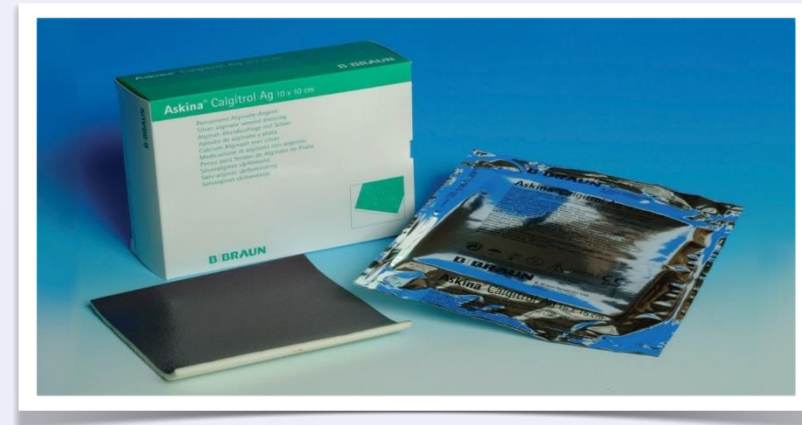


Objective of The Study

to analyze the cost-effectiveness of alginate silver dressing
Compared with 1% silver zinc sulfadiazine cream
in the treatment of pressure ulcer.



Silver Zinc Sulfadiazine Cream



Alginate Silver Dressing

Criteria

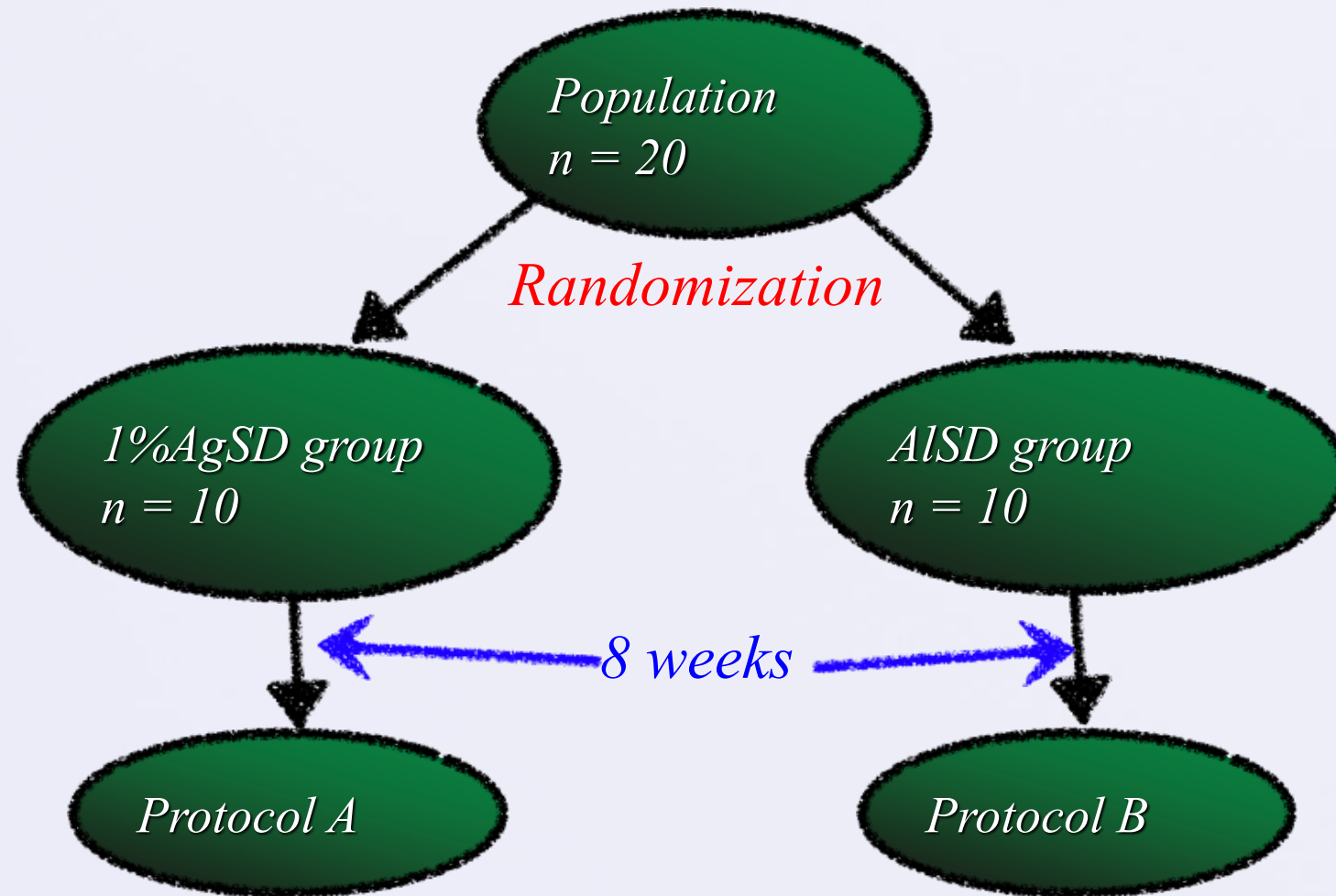
Inclusion

- Sacral and trochanteric
- Grade III-IV
- Cooperation
- Age > 20

Exclusion

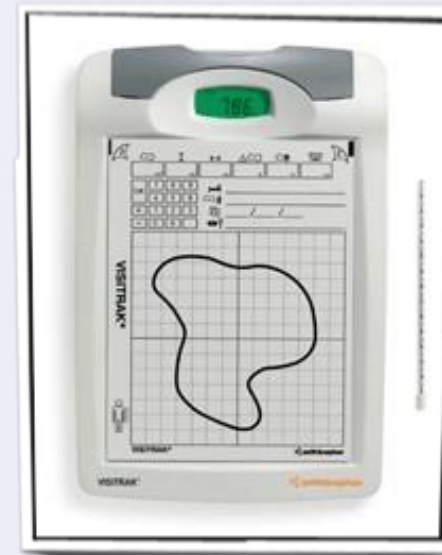
- *Inadequate debridement*
- *Apparent infection*
- *Hypersensitivity*
- *G-6-PD deficiency*

Study design



Evaluation and Assessment

- Demographic data : Age, gender, co-morbid conditions, grade and location of wound, number of wound dressing changes and debridement, cost of treatment
- Evaluator : **Blinded**
- PUSH 3.0 score
- Wound size : **VISITRAK**



PUSH 3.0 score

Length × Width	0 0 cm ²	1 <0.3 cm ²	2 0.3–0.6 cm ²	3 0.7–1.0 cm ²	4 1.1–2.0 cm ²	5 2.1–3.0 cm ²	Subscore
		6 3.1–4.0 cm ²	7 4.1–8.0 cm ²	8 8.1–12.0 cm ²	9 12.1–24.0 cm ²	10 >24 cm ²	
Exudate Amount	0 None	1 Light	2 Moderate	3 Heavy			Subscore
Tissue Type	0 Closed	1 Epithelial Tissue	2 Granulation Tissue	3 Slough	4 Necrotic Tissue		Subscore
							Total Score

- Scores : 0-17
- Wound size (Length X Width) : 0-10
- Exudate amount : 0-3
- Tissue type : 0-4

Evaluation and Assessment



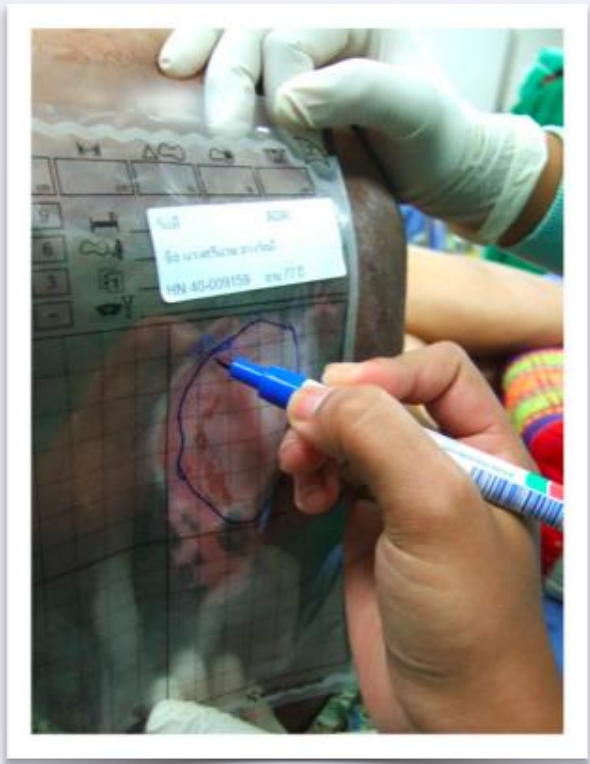
Cleanse the wound

Debride as needed

Evaluate wound for

- *Size*
- *Exudate amount*
- *Tissue type*

Dressing as protocol



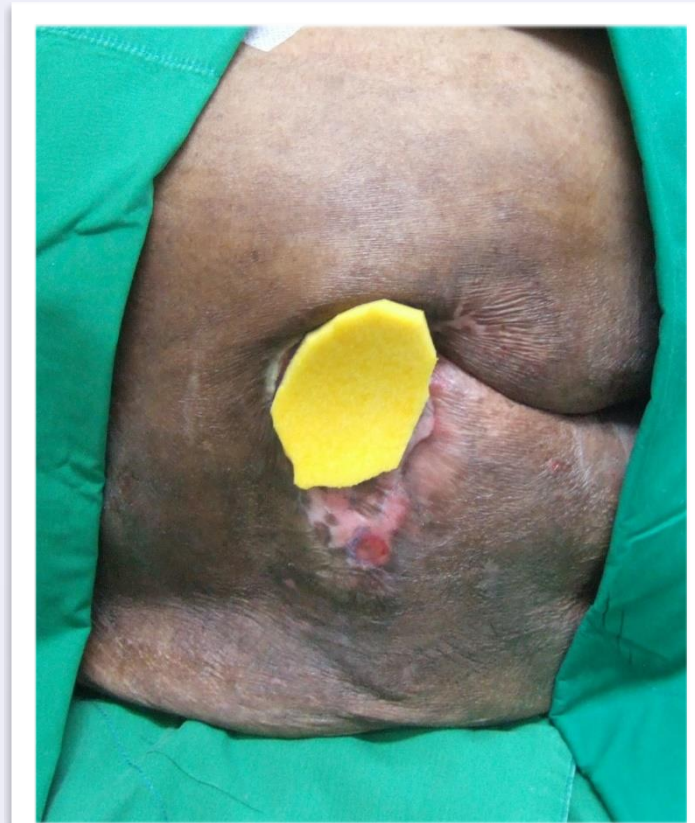
Protocol A : 1%AgSD group

- Apply silver zinc sulfadiazine cream to wound bed
- Cover wound with gauze
- Wound dressing every day
- Change outer dressing as needed



Protocol B : AISD group

- Apply Askina Calgitrol Ag® to wound bed
- Cut to fit wound size
- Change wound dressing every three days
- Change outer dressing as needed



Cost of Treatment

- Dressing unit cost : 8.06 USD/dressing change
- Debridement cost : 16.13 USD/debridement
- Product cost : 12.9 USD/100 cm²

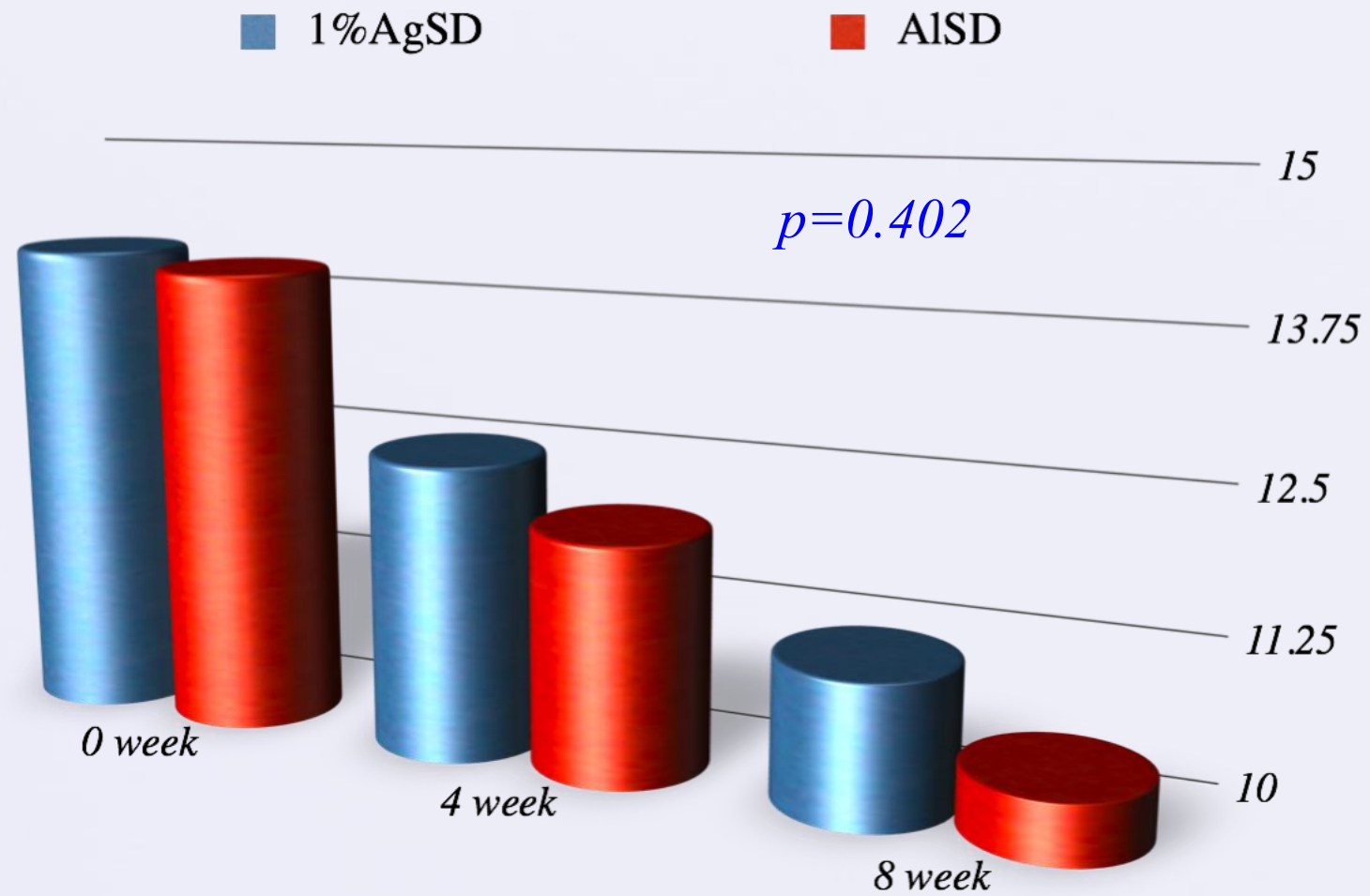
Statistical Analysis

- SPSS 16.0 software (SPSS, Chicago, IL.)
- χ^2 test : categorical data
- Student t test
- Mann-Whitney nonparametric test
- $p < 0.05$: significant

Demographic Data

	AlSD treated group (n=10)	1% AgSD treated group (n=10)	<i>p</i> value
Age	76 ± 7.88	73.3 ± 7.27	0.437
Sex (M:F)	4:6	4:6	1.00
BMI	21.61 ± 2.03	23.58 ± 2.4	0.064
Diabetes	5	2	0.35
Hypertension	2	4	0.628
Dyslipidemia	1	3	0.582
Old CVA	6	5	1.00
Pressure Ulcer			0.718
Grade	8	8	
III	5	7	
IV			
Pressure Ulcer			1.00
Location	9	10	
Sacrum	2	4	
Right trochanteric	2	1	
Left trochanteric			

PUSH score



Case presentation 1

AISSD Group



Week 0



Week 2



Week 4



Week 8

Case presentation 2

AISD Group

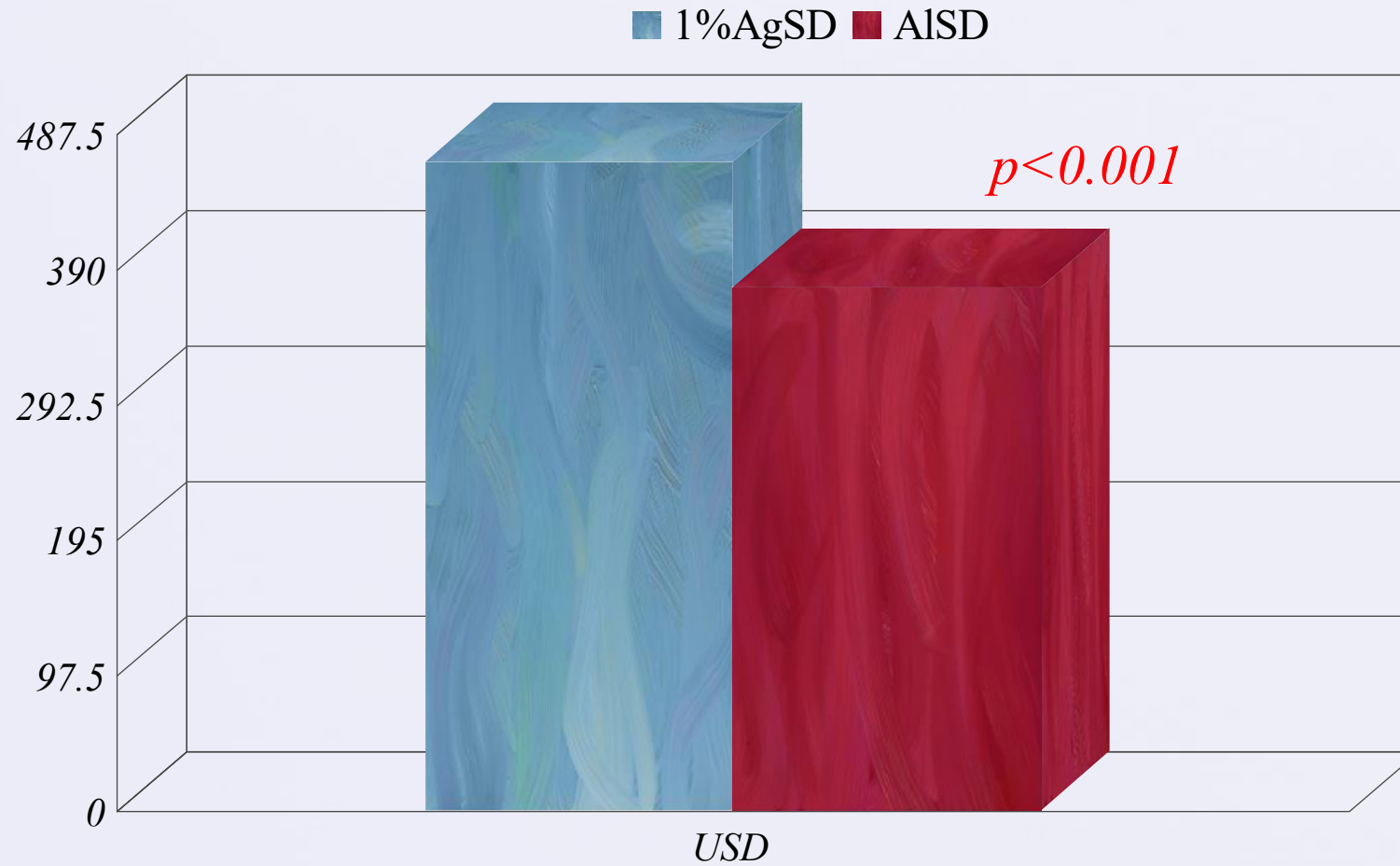


Week 0



Week 8

Cost of Treatment

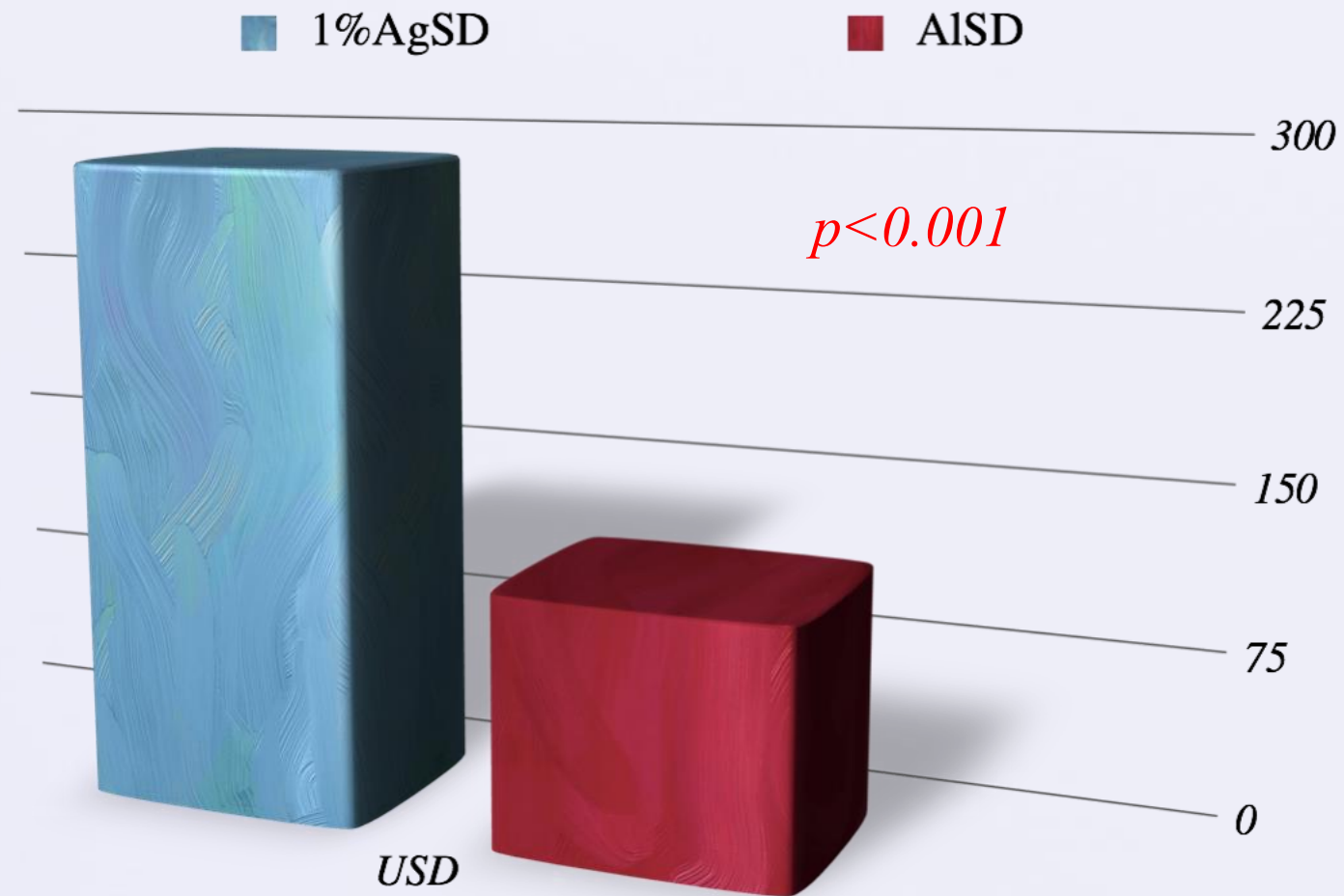


Sensitivity Analysis

- Uncertainty of the Cost-effectiveness ratio
- “Dressing unit cost”



Cost of Treatment



Results Twenty patients (12 women and 8 men) were randomly assigned to receive either AISD (n=10) or AgZnSD cream (n=10). The demographic data and wound characteristics were comparable in the two groups. The two groups showed no significant difference in the reduction of PUSH score, wound size, or volume of exudate. The tissue type score was significantly lower in the AISD group ($3.15 \pm 0.68 - 1.85 \pm 0.68$ vs. $2.73 \pm 0.79 - 2.2 \pm 0.41$; $P=0.015$). The cost of treatment was significantly lower in the AISD group (377.17 vs. 467.74 USD, respectively; $P<0.0001$).

Conclusions Alginate silver dressing could be effectively used in the treatment of grade III and IV pressure ulcers. It can improve wound tissue characteristics and is cost-effective.

Biofilm

- Biofilm is a complex aggregation of microorganism growing on a solid substrate submerged, are characterized by structural heterogeneity and extracellular matrix of polymeric substance (EPS)
- The exact composition generally consists of polysaccharides, proteins, glycolipids and bacterial DNA.
- E. coli, staphylococci and Pseudomonas are the most common invading bacteria

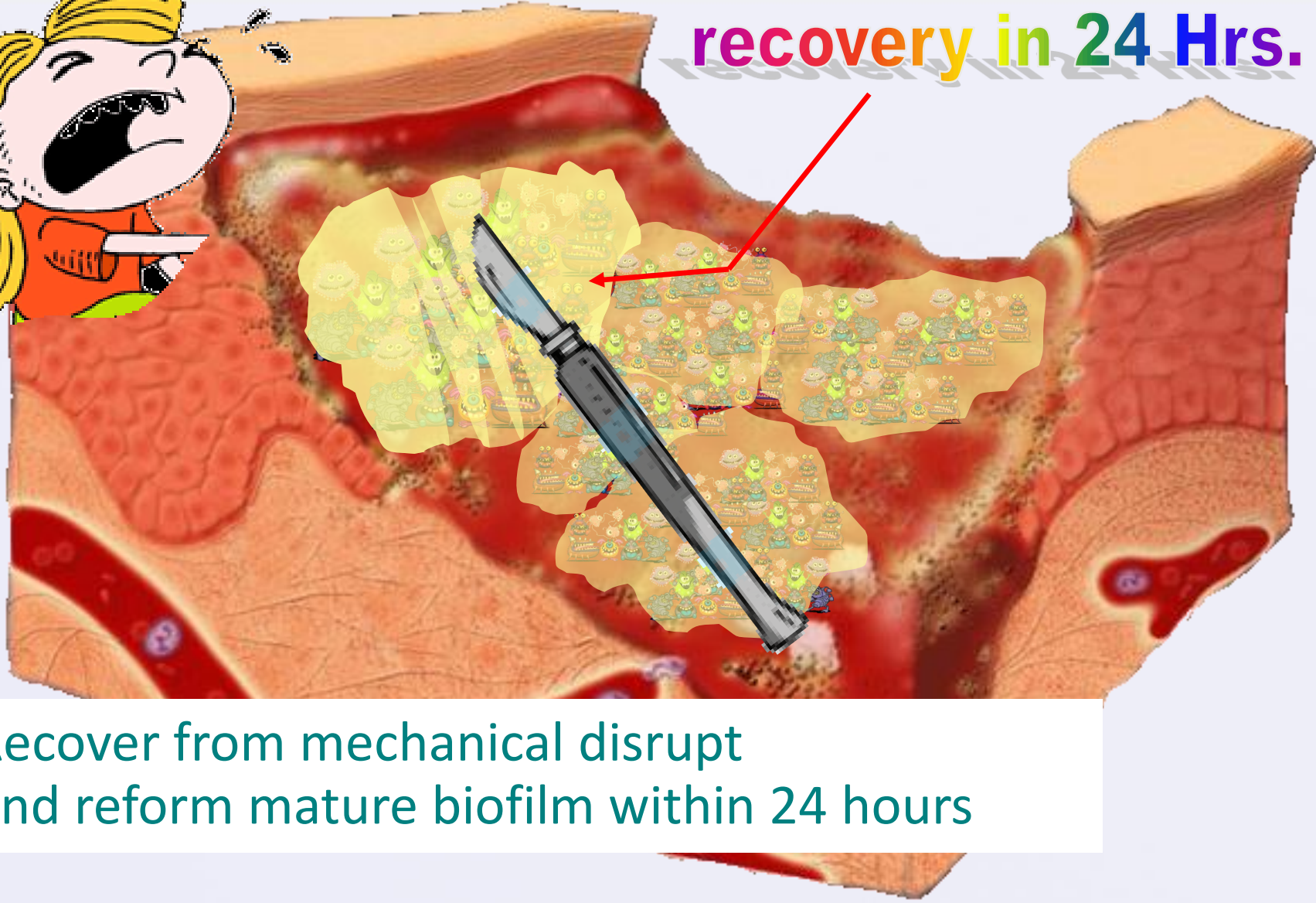


Slough

Biofilms stimulate inflammation, which increase vascular permeability and production of wound exudate and build up fibrin slough. Therefore, slough may indicate the presence of biofilm in a wound

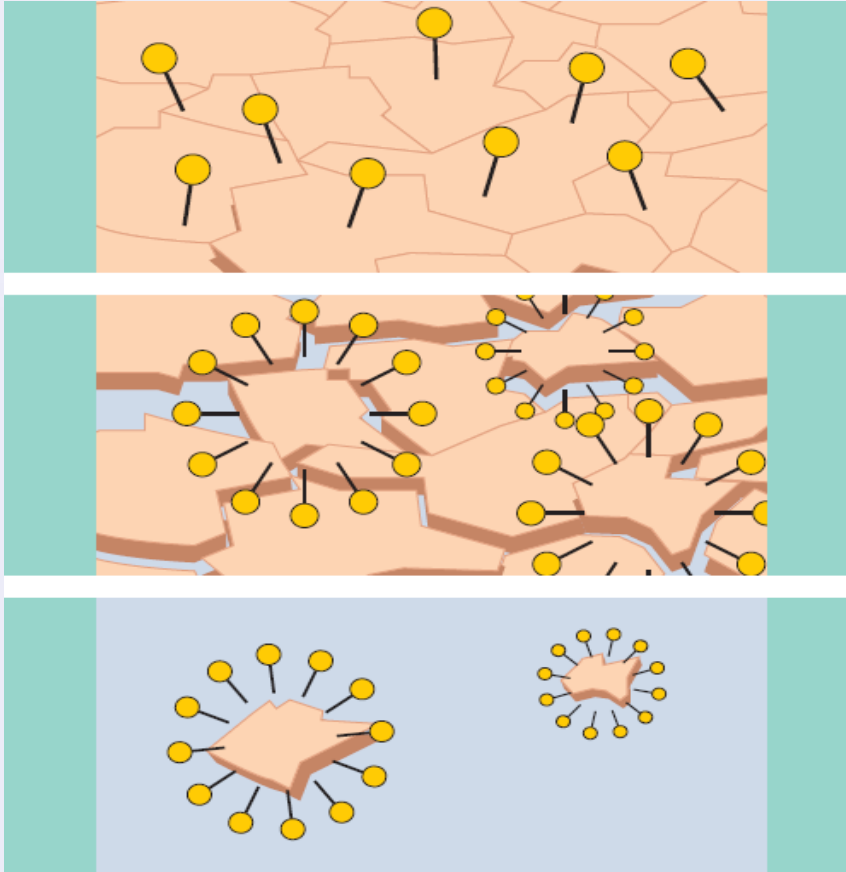


recovery in 24 Hrs.



Recover from mechanical disrupt and reform mature biofilm within 24 hours

Surfactant – how do they work?



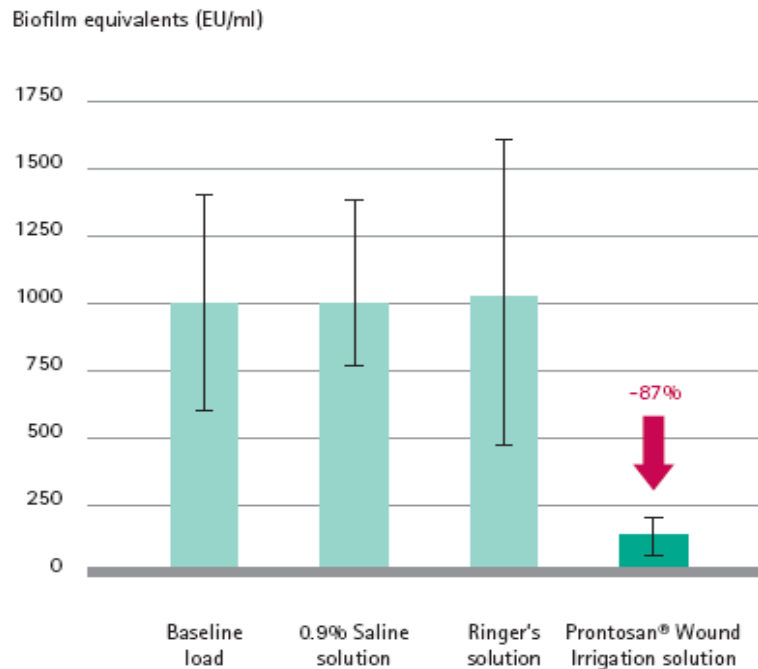
Reduce the surface tension of water

Support softening, loosening and detaching of dirt

Disperse dirt(bind dirt in the solutions, preventing recontamination)

Efficacy of wound irrigation solutions against biofilm

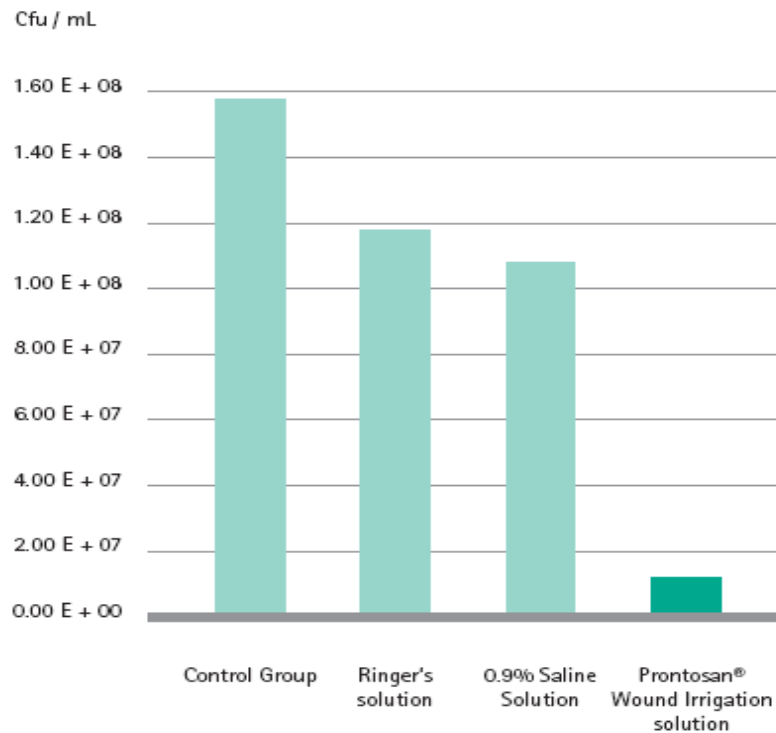
Comparison of the efficacy of different wound irrigation solutions against biofilm (*Pseudomonas aeruginosa*) after 24 hours exposure time



The result showed no decrease in the original biofilm load after exposure to normal saline solution as well as Ringer solution, while the surfactant polihexanide solution achieved a significant reduction of the biofilm by 87%

In-vivo evidence of betaine and polihexanide containing wound irrigation solution cleansing efficacy against biofilms

Determination of the effects of Prontosan® Wound Irrigation Solution on methicillin resistant *Staphylococcus aureus* biofilms in a partial thickness porcine wound model



Removal of MRSA biofilm was only demonstrated using the betaine and polihexanide containing wound irrigation solution; both salt solutions failed to reduce MRSA count

Conclusion

- Alginate silver dressing (Askina Calgitrol Ag®) could be used in treatment of sacral and trochanteric pressure ulcer grade III and IV
- Good wound healing rate
- Reduce the number of dressing changes and overall cost of treatment



Thank You for your Attention



Thank You