Pressure Ulcers and Nutrition

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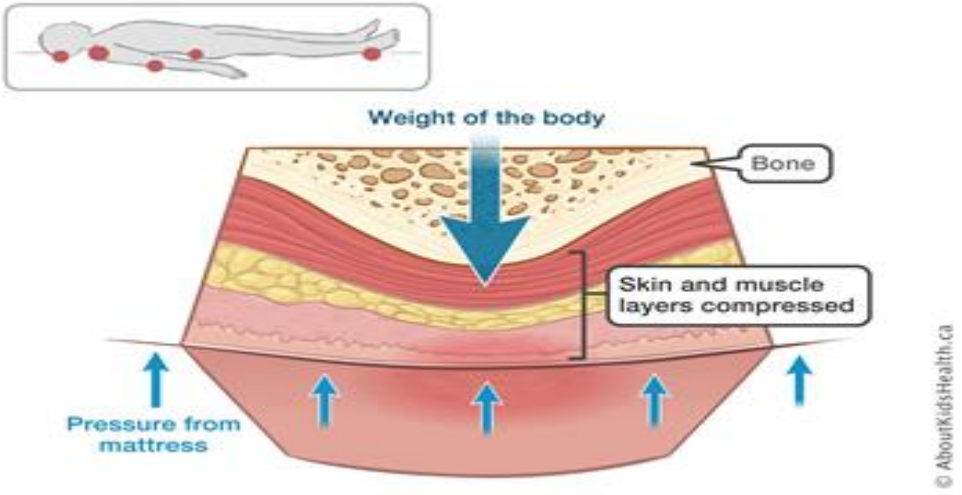
Personal Interest

What is a Pressure Ulcer

- Injuries to skin and underlying tissue from pressure on the skin
- Common areas are heels, ankles, hip, and tailbone



Bedsores (pressure ulcers). (2018, March 9). Retrieved from https://www.mayoclinic.org/diseases-conditions/bed-sores/symptoms-causes/syc-20355893

Prevalence in the U.S.

- More than 2.5 million patients will develop pressure ulcers annually
- Costing the US health care system $9.1-$11.6 billion per year

Bauer, K.,et al.

Pressure Ulcer Staging

Risk Factors

- Immobility
- Lack of sensory perception
- Conditions affecting blood flow
- Poor nutrition and hydration

Bedsores (pressure ulcers). (2018, March 9). Retrieved from https://www.mayoclinic.org/diseases-conditions/bed-sores/symptoms-causes/syc-20355893

Increased Nutrient Needs

- Calories: 30-35 kcal/kg body weight/day
- Protein: 0.95-1.5 g/kg body weight/day

Munoz, N. (2016). Skin Integrity: NPUAP Pressure Injury stages and the Affect of the IMPACT Act . *Dietetics in Health Care Communities* , *42*(1), 2–15.

Study #1

“Estimation of protein loss from wound fluid in older patients with severe pressure ulcers”

Iizaka, S., Sanada, H., Nakagami, G., Sekine, R., Koyanagi, H., Konya, C., & Sugama, J. (2010). Estimation of protein loss from wound fluid in older patients with severe pressure ulcers. *Nutrition*, *26*(9), 890–895. doi: 10.1016/j.nut.2009.09.008

Research Purpose

- Is protein loss from wound fluid recognized as a contributing factor to the deterioration of the nutritional status in the older population with severe pressure ulcers?

Izaka, S., et al. (2010)

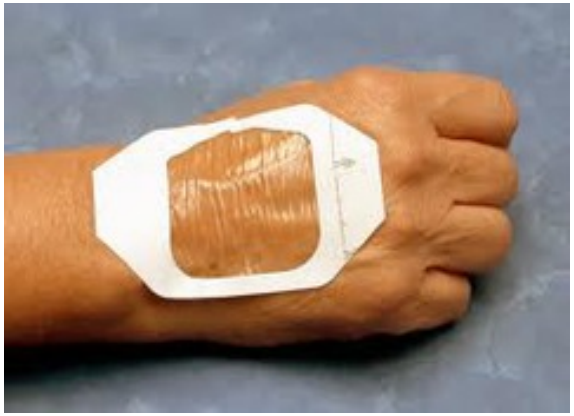
Research Methods

- **Recruitment**: two university hospital, six community hospitals, one long-term care hospital, and one nursing home all in Japan
- **Inclusion**: 60 years old or older and have at least one full thickness pressure ulcer that was producing wound fluid
- **Exclusion**: Under 60 years old or a pressure ulcer not producing wound fluid

Izaka, S., et al. (2010)

Data collection

- Wounds were first analyzed and scored using the DESIGN
- Wound fluid was collected 2.5 hours after dressing change.



Izaka, S., et al. (2010)

Equation for Estimated Amount of Protein Loss (g/d)

$$\frac{\text{Concentration of total protein (g/dL)}}{\text{Amount of wound fluid/collected time (dL/h)} \times 24\ \text{h}}$$

Izaka, S., et al. (2010)

Results

- 21 out of 25 wounds lost less than 0.5 g/ day of protein
- 4 wounds lost more than 1.5 g/d of protein

Izaka, S., et al. (2010)

Patients	A	B	C	D
Protein loss (g/day)	2.0	2.1	1.5	1.9
Wound site	Greater trochanter	Sacrum	Greater trochanter	Sacrum
DESIGN	22	21	24	25
Infection	yes	no	yes	yes
Wound area	86.1	64.8	109.3	-
Wound fluid volume (µl/h)	1820	1960	1110	1670
Debriedment	yes	yes	no	no
Nutritional route	parenteral	oral	oral	parenteral
Protein intake	-	15	73.8	-
Nitrogen intake	4.7	2.4	11.8	4.7
Relative protein loss (%)	6.7	13.8	2.1	6.6
Serum albumin	1.9	3.6	2.7	3.6
C-reactive protein	7.6	3.6	7.4	-

Izaka, S., et al. (2010)

Strengths

- Consistent formula
- Analyzed consistently
- Study was over a year

Limitations

- No mention of how many times the wound fluid was tested
- Different environments
- Who measured the fluid could have been inconsistent
- Small sample size

Izaka, S., et al. (2010)

Final Conclusion

- “The amount of protein loss could be small and may not be related directly to nutritional status, although it increased as the wound became more severe”

Article Rating: Negative

Izaka, S., et al. (2010)

Study #2

"Clinical validity of the estimated energy requirement and the average protein requirement for nutritional status change and wound healing in older patients with pressure ulcers: a multicenter prospective cohort study"

Iizaka, S., et al. (2014).

Research Purpose

- Evaluate the clinical validity of the estimated energy and protein requirements in the older hospitalized patients with pressure ulcers by assessing nutritional status and wound healing.

Iizaka, S., et al. (2014).

Research Methods

- **Recruitment**: 14 general hospitals, 12 university hospitals, and 3 long term care facilities
- **Inclusion**: Patients 65 or older who were hospitalized and had at least one pressure ulcer
- **Exclusion**: Patients discharged within 1 week or did not have pressure ulcer.

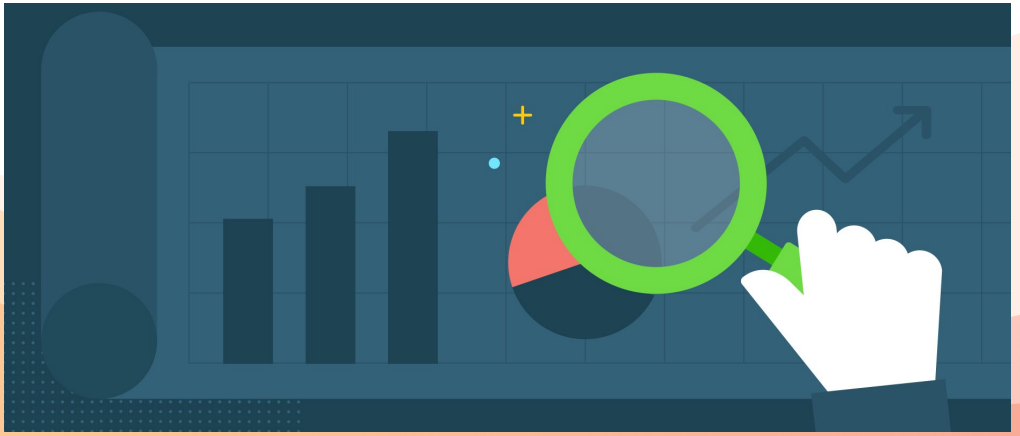
Iizaka, S., et al. (2014).

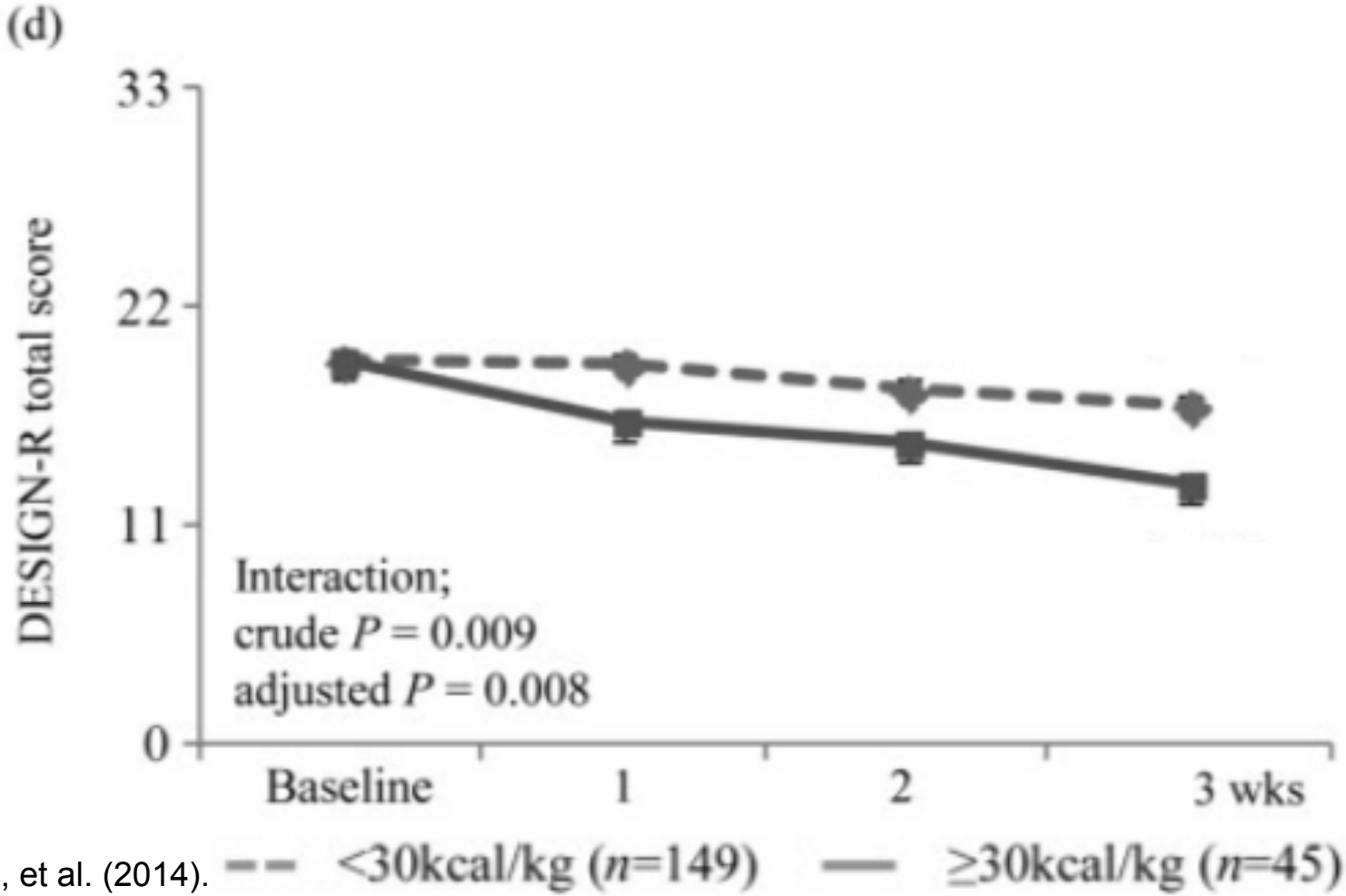
Data Collection

- Measured nutrition status at baseline
- Wound was measured using DESIGN
- After 3 weeks, nutrition status, calorie and protein intake, and wound status were measured

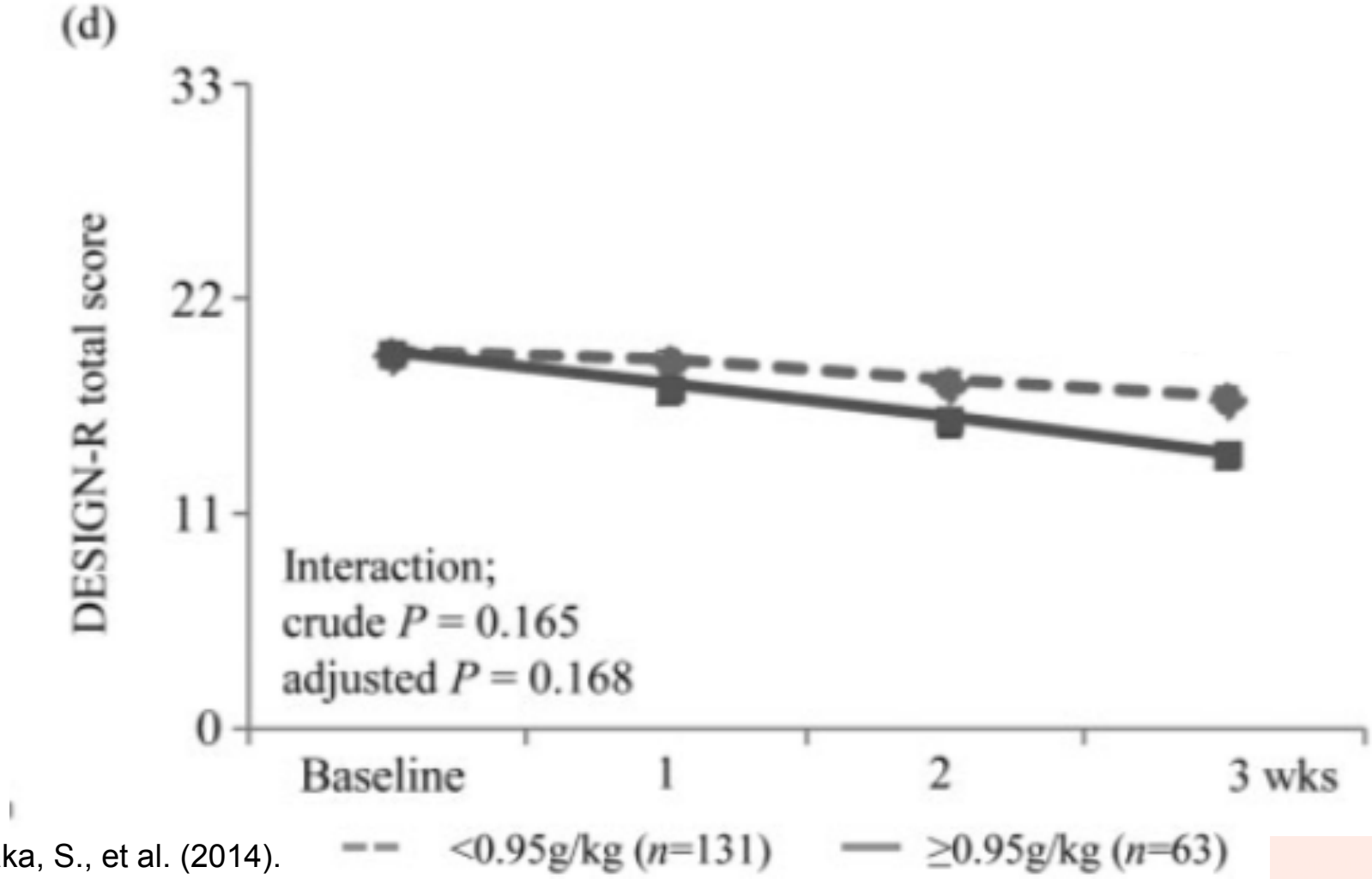
Iizaka, S., et al. (2014).

Results





Iizaka, S., et al. (2014).



Iizaka, S., et al. (2014).

Strengths

- Consistent data collection
- Consistent treatment of wound
- Protein requirement adjustments

Limitations

- Length of study
- Control on what participants ate
- No record of supplementation

Author's Conclusion

- "Estimated energy requirement and average protein requirements were clinically validated for prevention of nutritional decline and of healing of deep pressure ulcers."

Article Rating: Positive

Iizaka, S., et al. (2014).

Study #3

“A nutritional formula enriched with arginine, zinc, and antioxidants for the healing of pressure ulcers”

Cereda, E., Klersy, C., Serioli, M., Crespi, A., & D'Andrea, F. (2015). A Nutritional Formula Enriched With Arginine, Zinc, and Antioxidants for the Healing of Pressure Uclers. *Annals of Internal Medicine*, *163*(12), 964. doi: 10.7326/l15-5188-3

Research Purpose

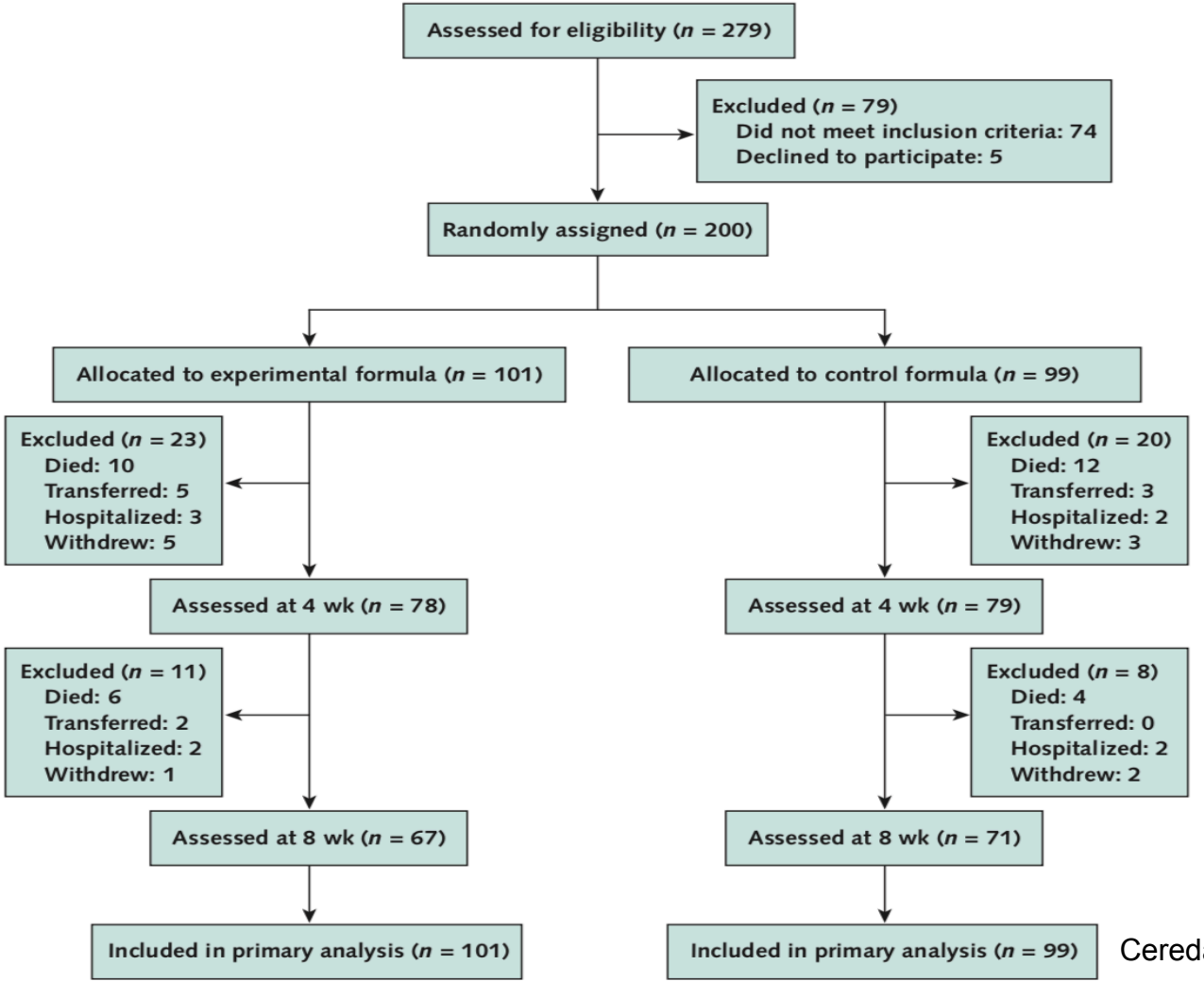
- Evaluate whether supplementation with arginine, zinc, and antioxidants within a high-calorie, high-protein supplement improves pressure ulcer healing.

Cereda, E., et al, 2015

Research Methods

- **Recruitment**: Long-term care and home care services
- **Inclusion**: Patients must have stage II, III, or IV pressure ulcer, malnourished, able to drink, and provide written consent
- **Exclusion**: Uncontrolled diabetes, acute organ failure, cellulitis, sepsis, and artificial nutrition

Cereda, E., et al, 2015



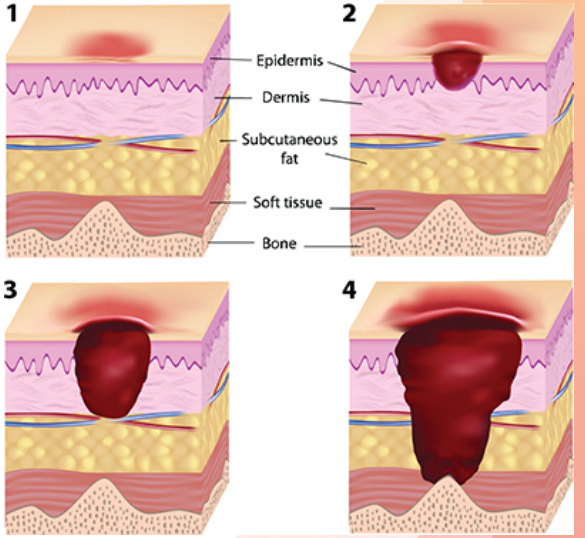
Cereda, E., et al, 2015

Nutrient	Experimental Formula	Control Formula
Protein (g)	10	10
Calories (kcal)	125.8	127.2
Arginine	1.5	0
Zinc (mg)	4.5	2.3
Copper (mcg)	675	338
Manganese (mcg)	1.30	0.63
Selenium (mcg)	32	11
Vitamin E (mg)	19	2.3
Vitamin C (mg)	125	19

Cereda, E., et al, 2015

Data Collection

- Wound initially assessed for stage
- Wound nurse trained to assess wound area



Cereda, E., et al, 2015

Results

End Point (Primary)	Experimental Formula (n=78)	Control Formula (n=79)	P-Value
Mean reduction in PU area at 8 wk, %	62.9	43.4	0.005

End Point (Secondary)	Experimental Formula (n=78)	Control Formula (n=79)	P-Value
> or equal to 40% reduction in PU at 8 wk, %	73.1	51.9	0.002
Complete healing, %	15.4	7.6	0.042

Cereda, E., et al, 2015

Strengths

- Length of study
- Consistency of data collection
- Similar protein and calorie needs in the supplementation
- Recorded energy and protein intake in diet

Limitations

- Specific inclusion
- Number of participants
- No record of arginine, zinc, or antioxidant in diet

Author's Conclusion

- " Among malnourished patients with pressure ulcer, 8 weeks of supplementation with an oral nutritional formula enriched with arginine, zinc, and antioxidants improved pressure ulcer healing."

Article Rating: Positive

Cereda, E., et al, 2015

Professional Opinion

- It is important to be aware of the increased needs for each patient.
- With NFPE, we can be more aware of the wound healing.
- Having supplements with arginine, zinc, and antioxidants can be beneficial.

Questions?

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