



Effects on Blood Flow Velocity, Wound Healing and Pain in Hand Microsurgery Patients Following Heating on Non-affected Side

Heeyoung So, PhD, RN

College of Nursing, Chungnam National University

Co-Author

- Minsuk Kim, PhD, RN
Department of Nursing,
Baekseok Culture
University, Korea



Korean Peninsula



Key Takeaways

- Foot bath program on post operation blood circulation, pain, stress in emergency hand replantation patients (Yoon, 2009)
- Heating of one area of the body produces reflex-modulated vasodilations in distant-body areas; i.e. heat one extremity and the contralateral extremity also dilates (Lehmann, 1989)
- Simple, efficient, and inexpensive means of patient care

Significance

- Temperature has an effect on
 - Relief of pain
 - Increase in flexibility of collagenous tissues
 - Reduction of muscle spasm
 - Increase in blood flow
 - Mental relaxation

(Int'l Association for the Study of Pain, 1997)

Heat Therapy

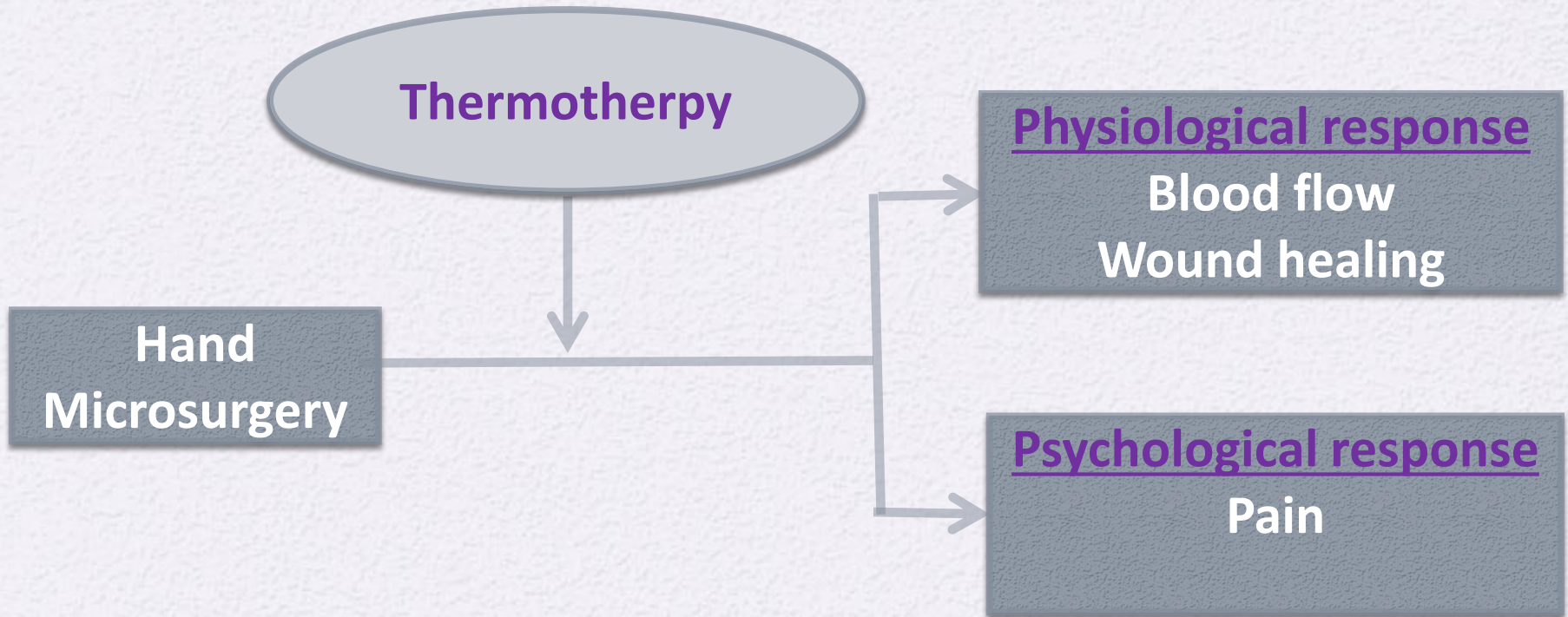
- The extensibility of collagen tissues, ↑ blood flow
 - Increased blood flow to the affected area provides proteins, nutrient, and oxygen for better healing.
- ↓ Joint stiffness
- ↓ Pain & relieving muscle spasms
- ↓ Inflammation, edema

(Arnheim, 2008)

Working Hypothesis

1. The blood flow velocity in the experimental group (EG) perform the contralateral thermotherapy will be faster compared to the control group (CG) did not perform.
2. The wound healing scores in the EG conducted a contralateral hand hyperthermia will be higher compared to the CG did not conduct.
3. The pain scores in the EG conducted a contralateral hand hyperthermia will be lower than in the CG did not conduct.

Conceptual Model



Study Purpose

- To identify the effects of heating on the non-affected hand on blood flow velocity, wound healing, and pain

Research Design

Pre Treatment Pre Intervention	Post Surgery	1Wk	2Wks
Intervention	O2	O3	O4
O1 X			
Non Intervention	O2	O3	O4

O = Observation
Wk = week

X = Intervention

Thermotherapy Intervention Protocol

Thermotherapy

- Water temperature: 43°C, room temperature: 24-28°C
- Tissue temperature: 40-45°C
- Automatic thermo regulator for maintaining water temperature
- Duration: 30min/day
- when: 2 hours after meal
- Length of intervention: 2 weeks

Post intervention care

- Apply hand lotion after dry hand with towel



Regular Care for All Participants

Visiting Participants everyday

- Explaining healing process
- Caring wound for against infection
- Applying Infrared ray lamp on affected hand
- Zone **I** & **II** : leech & bleeding method for 7 days
- Wound care with hydrogen peroxide & antibiotics
- Applying ointment everyday

Participants

Inclusion criteria

- Hand microsurgery operated
- No skin injury on non-affected side
- 18 years or older
- Communicable
- Staying in a hospital at least 2 weeks
- Equivalent drug used between two groups

Measures

Blood flow velocity

- Assessed with a doppler (Hadeco, Inc. Japan)
- Mean blood flow velocity
- Systolic maximum blood flow velocity
- Diastolic maximum blood flow velocity
- Radial artery



Measures

Wound healing

- A six-item instrument
- Purulence, warmth, pain, swelling, redness, partial necrosis(partial stitch out)
- Scoring: 1 = yes, 2 = no, range: 7-14
- Higher score means better wound state

Pain

- Self-reported graphic rating scale
- 0= no pain 10=untolerable pain
- Higher score indicating severer pain

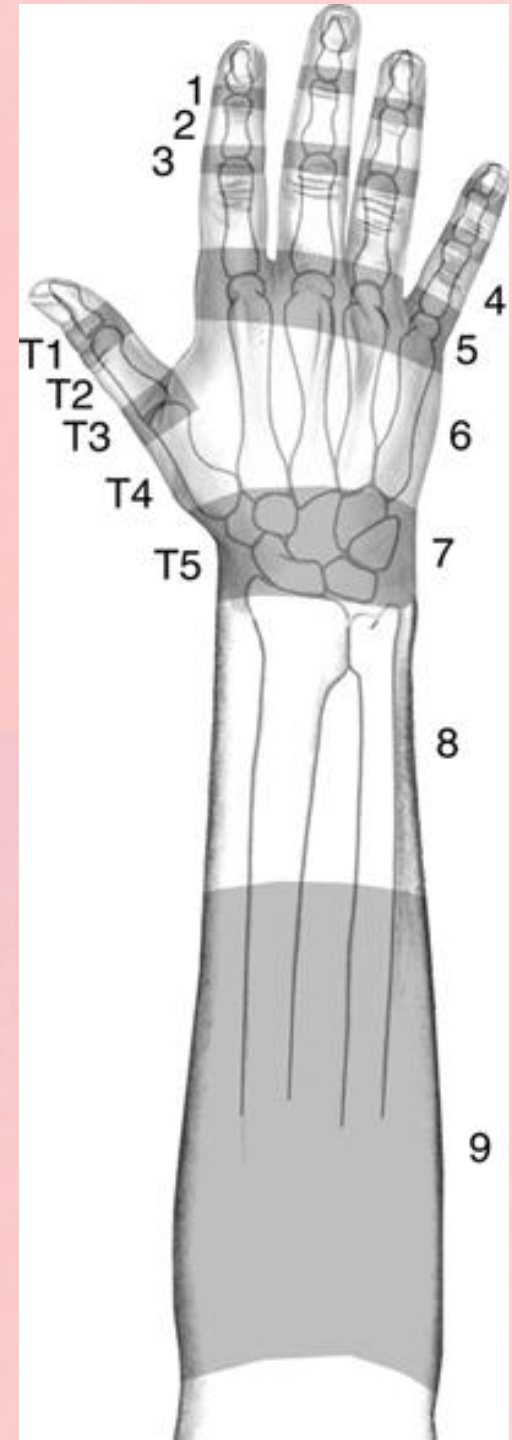
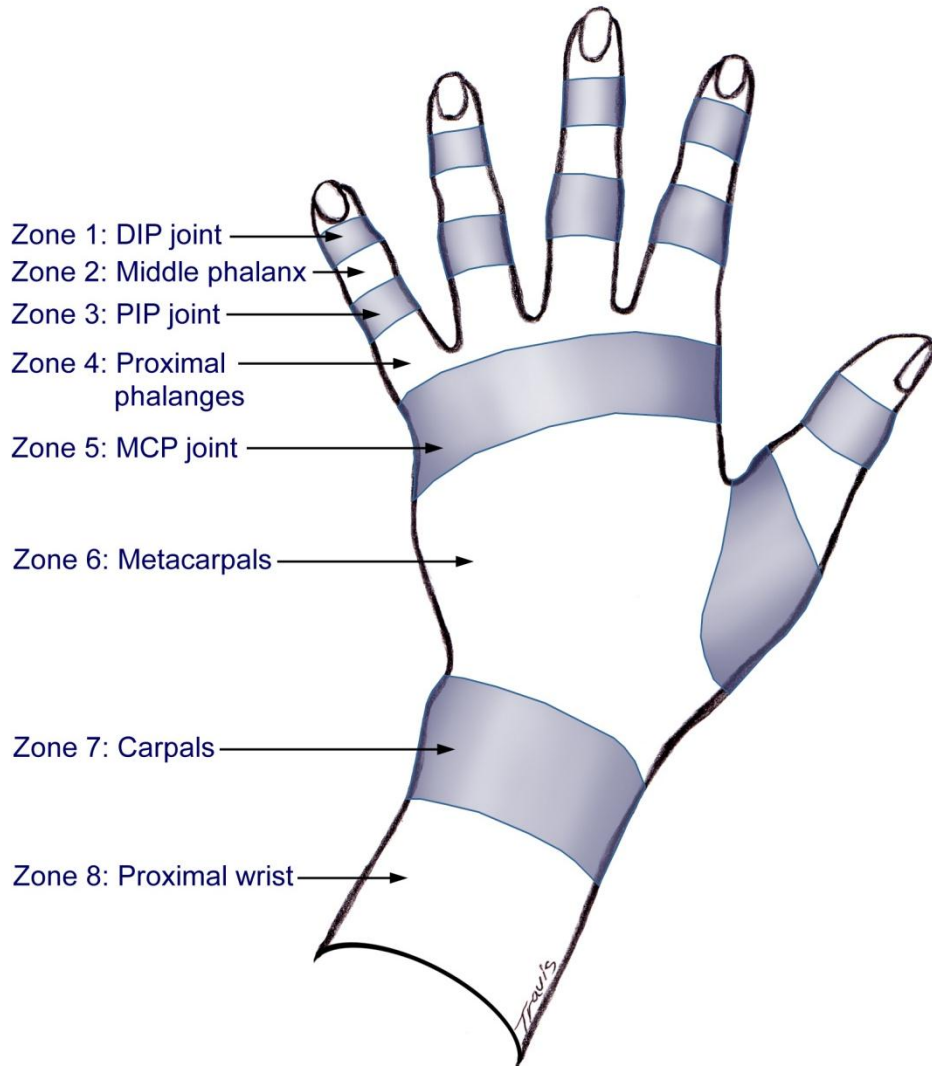
Demographic Characteristics of Sample

Characteristics	Total Sample (N=39)		Experimental group (n=20)		Control group (n=19)	
Age(yrs) Mean \pm SD (Min-Max)	45.3 \pm 11.9 (18 - 64)		44.2 \pm 12.1 (18 - 62)		46.3 \pm 11.7 (20 - 64)	
	N	%	n	%	n	%
Education						
\leq Middle school	6	15.4	5	25.0	1	5.3
High school	22	56.4	9	45.0	13	68.4
\geq College	11	28.2	6	30.0	5	26.3
Marital status						
Single	12	30.8	6	30.0	6	31.6
Married	27	69.2	14	70.0	13	68.4
Gender						
Male	34	73.3	19	95.0	15	78.9
Female	5	26.3	1	5.0	4	21.1

Medical Characteristics of Sample

Characteristics	Total Sample (N=39)		Experimental group (n=20)		Control group (n=19)	
	N	%	n	%	n	%
Injured finger zone						
I	9	23.1	5	25.0	4	21.1
II	19	48.7	8	40.0	11	57.9
III	4	10.3	3	15.0	1	5.2
IV	7	17.9	4	20.0	3	15.8
Injured site						
Right	21	53.8	11	55.0	10	52.6
Left	18	46.2	9	34.0	9	47.4

Zones of hand

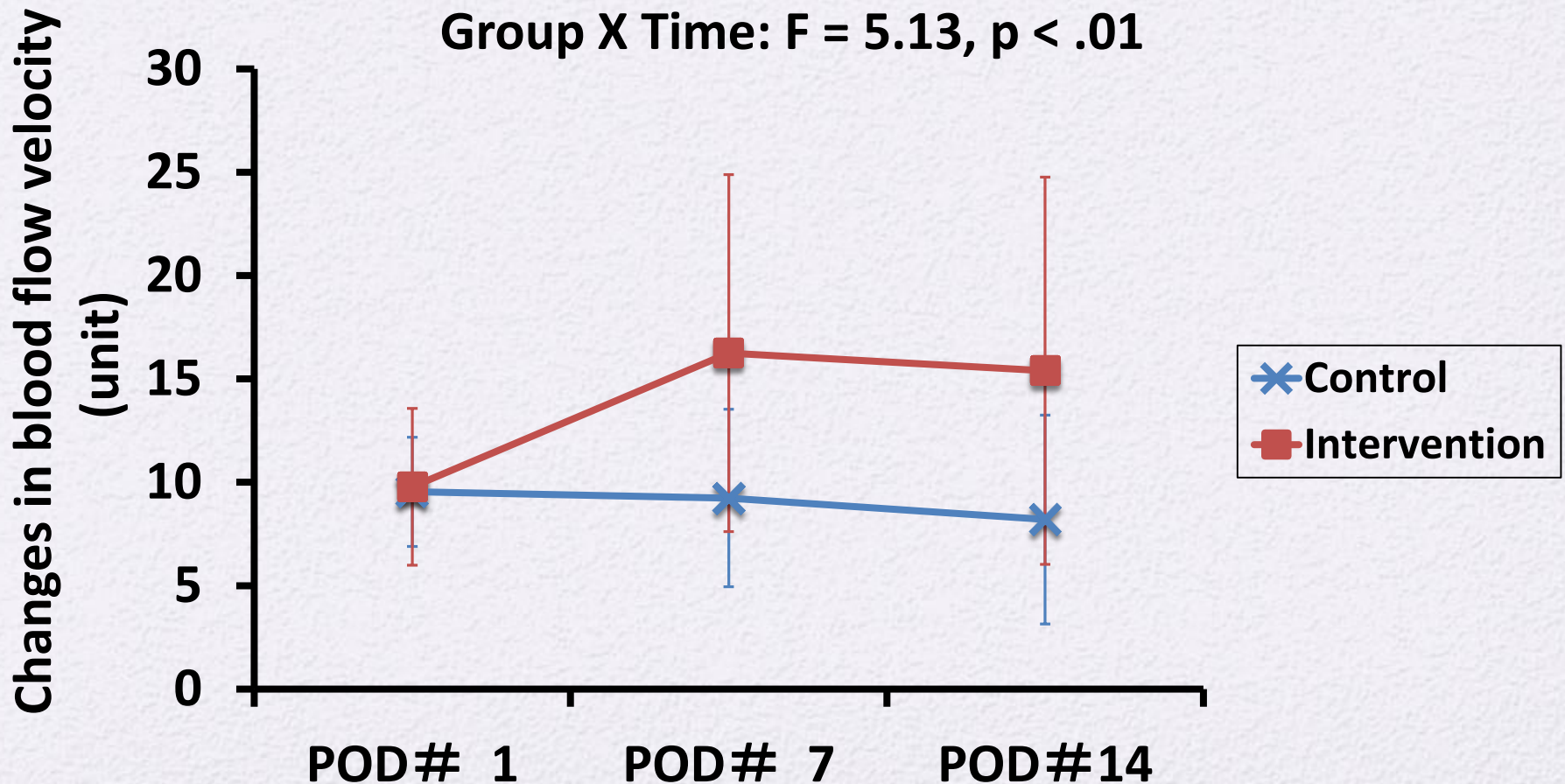


Medical Characteristics of Sample

Characteristics	Total Sample (N=39)		Experimental group (n=20)		Control group (n=19)	
	N	%	n	%	n	%
Number of injured finger						
1	25	64.1	12	60.0	13	68.4
≥2	14	35.9	8	40.0	6	31.6
Injured vector						
Machine	24	61.5	12	60.0	12	63.2
Rope	6	15.4	2	10.0	4	21.0
Others	9	23.1	6	20.0	3	15.8

Changes in Blood Flow Velocity Over Time by Intervention Group

Group: $F = 12.12, p < .001$
Group X Time: $F = 5.13, p < .01$

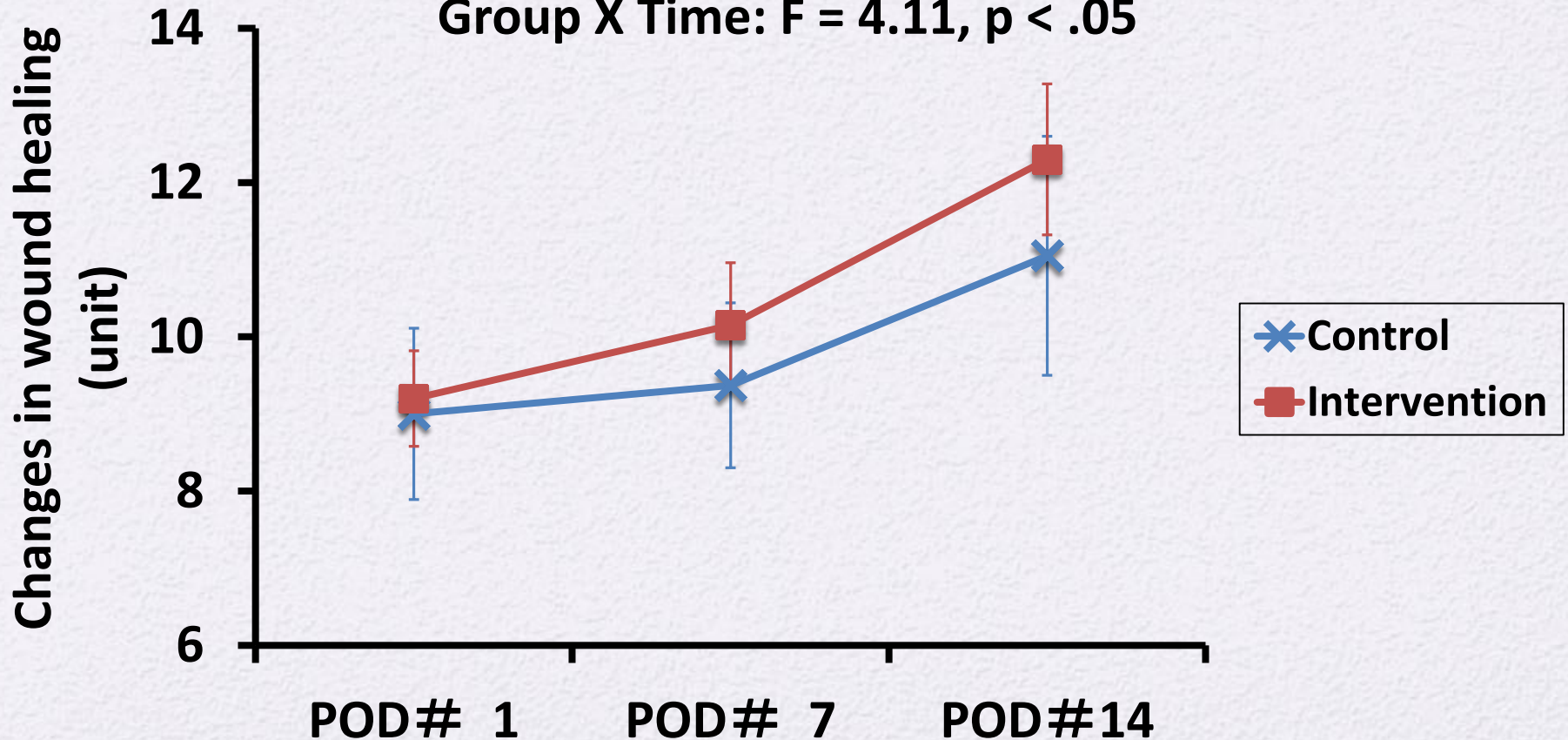


Changes in Wound Healing Over Time by Intervention Group

Group: $F = 7.95, p < .01$

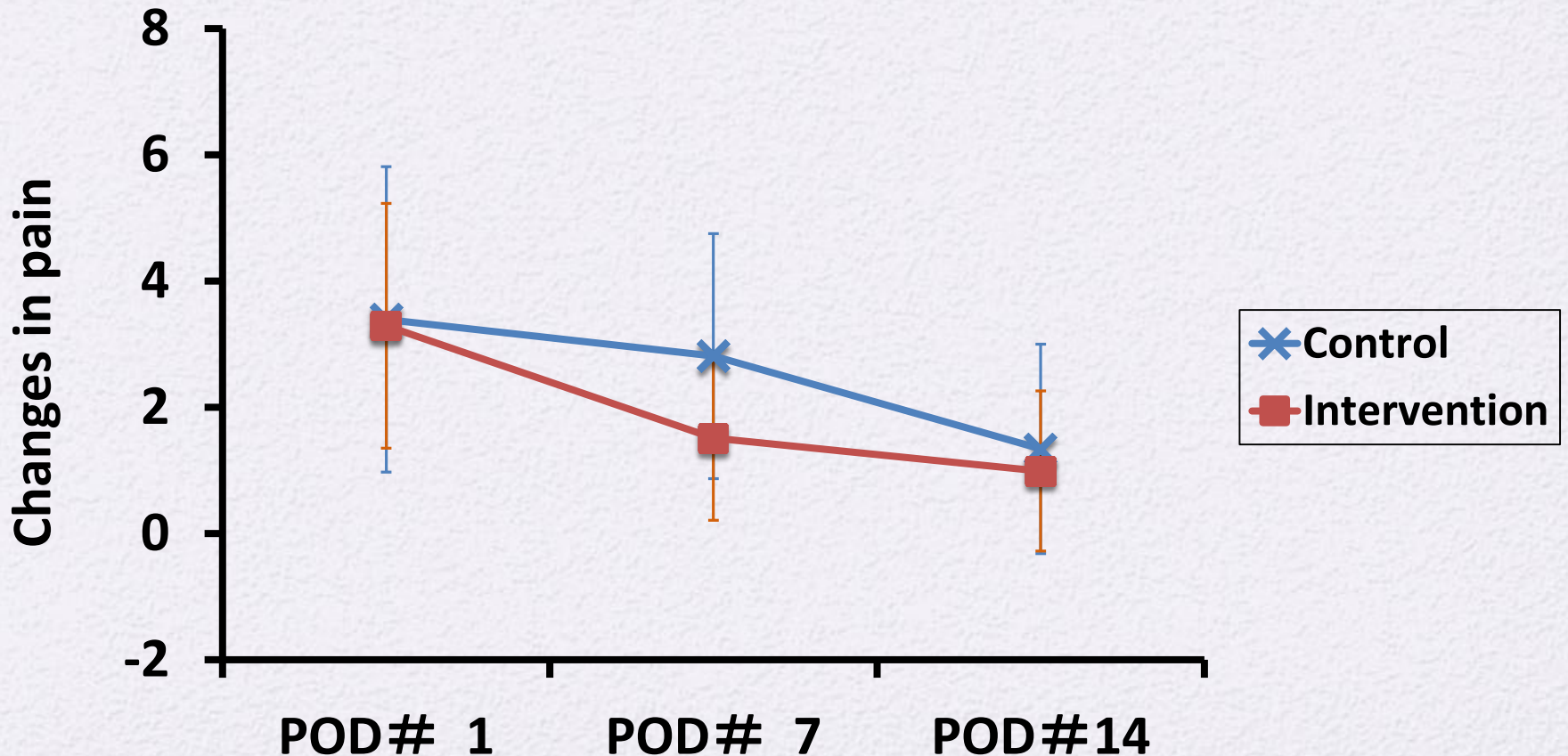
Time: $F = 107.05, p < .001$

Group X Time: $F = 4.11, p < .05$



Changes in Pain Over Time by Intervention Group

Time: $F = 28.26, p < .001$



Summary

- The contralateral hand heating was recommended as an independent nursing intervention for the operated patients who need improvement in blood flow velocity and wound healing.
- As the heating was effective even when applied on the non-affected side of hand, it is the applicable to patients who cannot tolerate any therapy on affected side.

Thank you for listening!!

