

# Comparison of two different Aquatic Physical Therapy Interventions in Patients with Knee- and Hip Arthroplasty: A randomised controlled trial -short term effect-

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# Background

# Hip and knee replacements in Switzerland 2008

**Knee replacement**

**14'207**

**Hip replacement**

**17'295**

Quelle: <http://www.bfs.admin.ch/bfs/portal/de/index/themen/14/04/01/data/01.html>

# General recommendations for rehabilitation after orthopaedic surgery

- Strengthening of muscles
- Mobilisation of joints
- Pain relief
- Relaxation of spastic muscles
- Balance and coordination
- General fitness

# Background



- In the early phase after joint replacement, exercise for ROM and force is recommended in Switzerland (Overberg 2007)
- Fluid mechanical properties are advanced: Buoyancy - Viscosity - Hydrostatic pressure – Drag (Harrison 1992; Tidhar 2007; Becker 2004)
- **We don't know which exercise is useful!** after joint replacement in lower extremities (Ehrler 2001; Guiaoqinto 2007, 2010)
- Several recommendations included aquatic physical therapy after knee and hip arthroplasty
- There is no different between land an water based rehabilitation in the early phase after total knee replacement (Harmer 2009)

## Aim of this study

- To compare the **short** and long term effects of a 3-week in rehabilitation and ***general aquatic therapy*** with the effects of a 3-week in rehabilitation and ***specific aquatic therapy*** in patients early after hip or knee joint replacement surgery in terms of mobility, risk of falling, range of motion and quality of life.

# Methods



- **Design:**
  - Randomised controlled trial with 3 month follow up
  - Concealed allocation
  - Blinded assessment at baseline
- **Setting:**
  - Inpatient rehabilitation
- **Participants:**
  - Knee- or hip arthroplasty <3 weeks
  - Patient capable to walk unaided in the pool
- **Statistical analysis:**
  - Wilcoxon signed rank test → within group comparisons
  - Mann-Whitney test → between group comparisons
- **Ethical approval:**
  - This study was approved by the ethics commission of the canton St. Gallen.

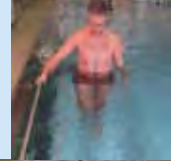





# Interventions

<b>One to one treatment on dry land</b>	<b>daily</b>	<b>60'</b>
<b>Group treatment on dry land</b>	<b>daily</b>	<b>40'</b>
<b>Aquatic physical therapy group</b>	<b>daily</b>	<b>30'</b>











# General aquatic therapy program

Group therapy daily 30 Min (hold at the railing or patient)

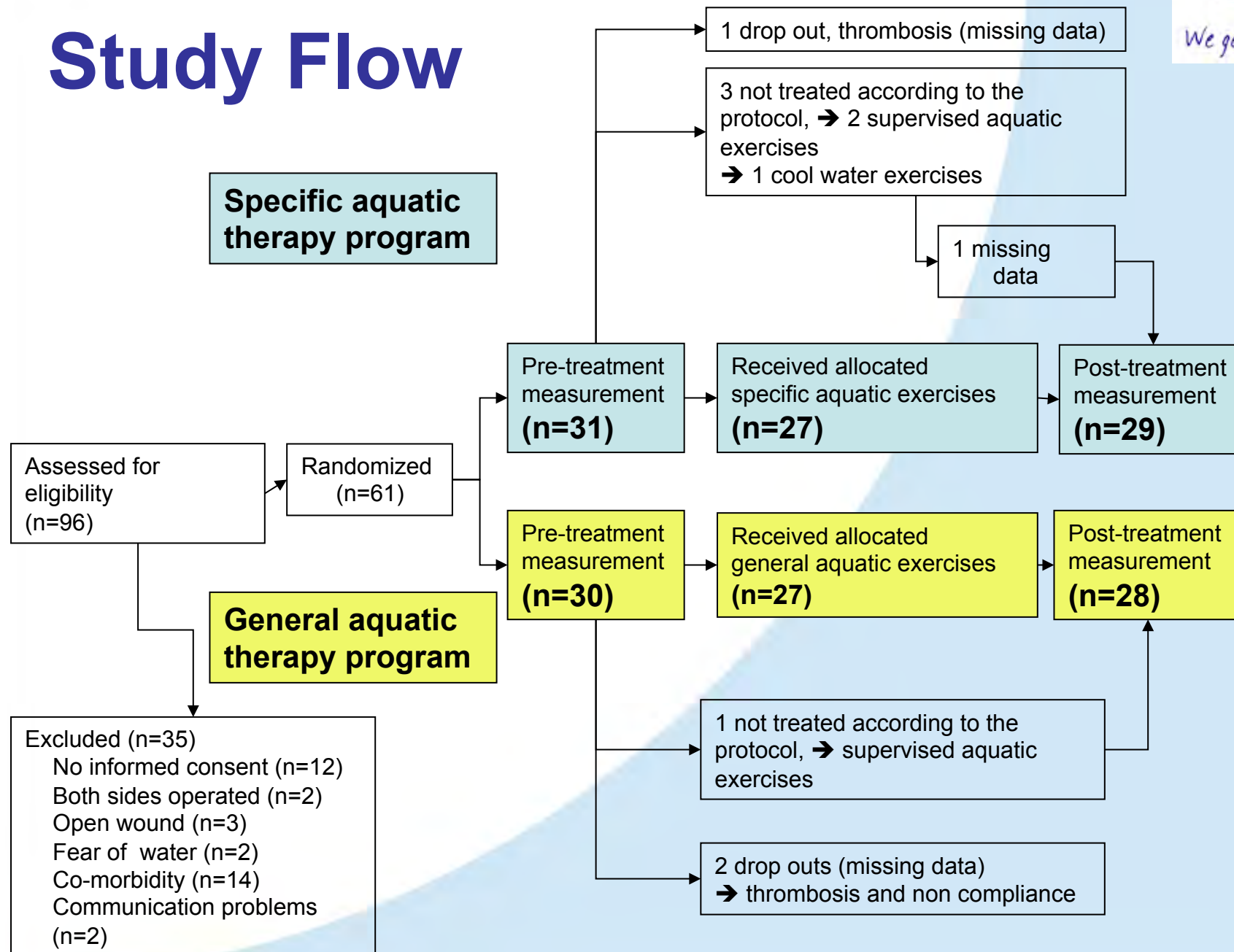
5'	Warm up	Walking al directions	
5'	Mobility	Bicycling forwards, backwards	
5'	Mobility	Hip abduction and adduction	
5'	Strengthen	Noodle up and down Swing the leg for- and backwards	
5'	Strengthen	Swing the noodle	
5'	Cool down	Walking al directions	

# Specific aquatic therapy program

Group therapy daily 30 Min (without any hold)

5'	Warm up	Walking al directions over obstacles, bean, hurdles	
4'	Mobility	Bicycling on noodle, Metacentric effect	
3'	Strengthen/Mobility	Swing leg ab- adduction, forward-backward	
2'	Mobility	Jump with soft landing	
3'	Strengthen	Jump with soft landing and stop and go	
3'	Balance	Walking stiff legs, stop and go	
5'	Walking speed	Deep water jogging	
5'	Cool down	Walking al directions	

# Study Flow



# Measurements



Measurement criteria	Assessment
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## Performance based measurements

Mobility after arthroplasty	Iowa Level of Assistance Scale (ILOAS)
Risk of falling	Timed Up and Go test (TUG)
Active joint range of motion (ROM)	Goniometer

## Patient centred outcomes

Symptoms and Disability	Western Ontario and McMaster Universities Questionnaire (WOMAC)
Fall related self efficacy	Falls Efficacy Scale International (FES-I)
Program evaluation	Visual analogue scale (VAS)
Numbers of falls	Questionnaire

# Time points of measurement



T1 Entry	T2 Discharge	T3 3 month follow up
<b>Performance based measurements</b>		
ILOAS	ILOAS	
TUG	TUG	
Goniometer	Goniometer	
<b>Patient centred outcomes</b>		
WOMAC	WOMAC	WOMAC
FES-I	FES-I	FES-I
	Program evaluation	
		Numbers of falls

# Results

# Group comparison at baseline



Characteristics	Specific aquatic exercise	Non specific aquatic exercise	sign.
Patients (male/female)	31 (15/16)	30 (15/15)	ns
Hip/knee arthroplasty	18/13	15/15	ns
Age	66.6 ( $\pm$ 9.5)	66.0 ( $\pm$ 11.9)	ns
Days after surgery	11.6 ( $\pm$ 3.3)	14.1 ( $\pm$ 17.7)	ns
Cause for arthroplasty			
Osteoarthritis	26	24	ns
Fracture	0	1	
Replacement	3	3	
Miscellaneous	2	2	
Weight bearing			
Full	17	15	ns
Partial	14	15	
Risk of falling (TUG)	17	20	ns
ILOAS	9.6 ( $\pm$ 2.8)	10.0 ( $\pm$ 4.1)	ns
WOMAC	885.1 ( $\pm$ 413.3)	1068 ( $\pm$ 507.5)	ns
FES-I	31.0 ( $\pm$ 11.4)	32.8 ( $\pm$ 11.2)	ns

# Rehab and treatment days

Group	Rehabil. days	Treatment days
General aquatic therapy	19.4 (5.3)	9.6 (2.9)
Specific aquatic therapy	18.5 (5.0)	9.5 (3.9)

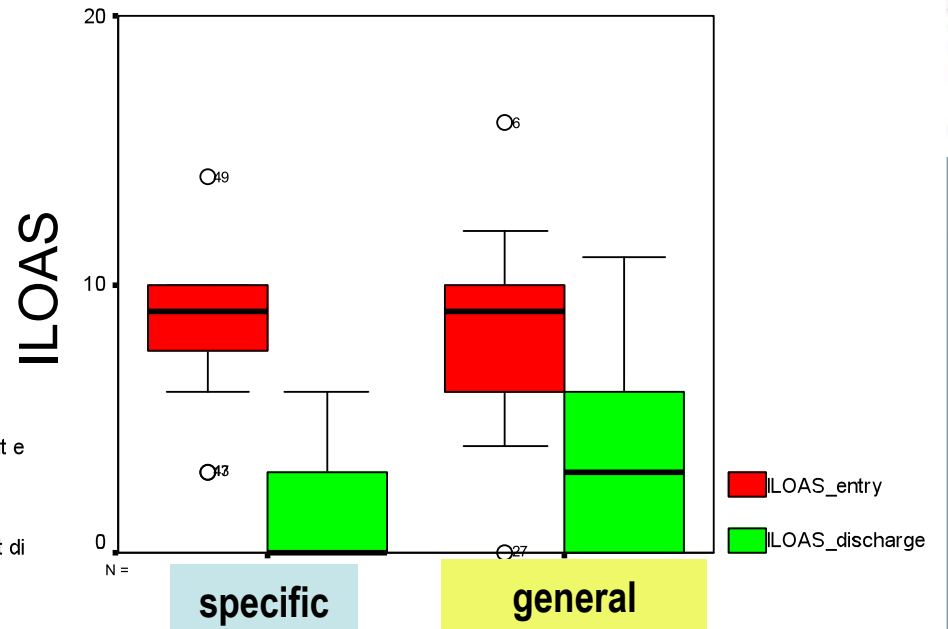
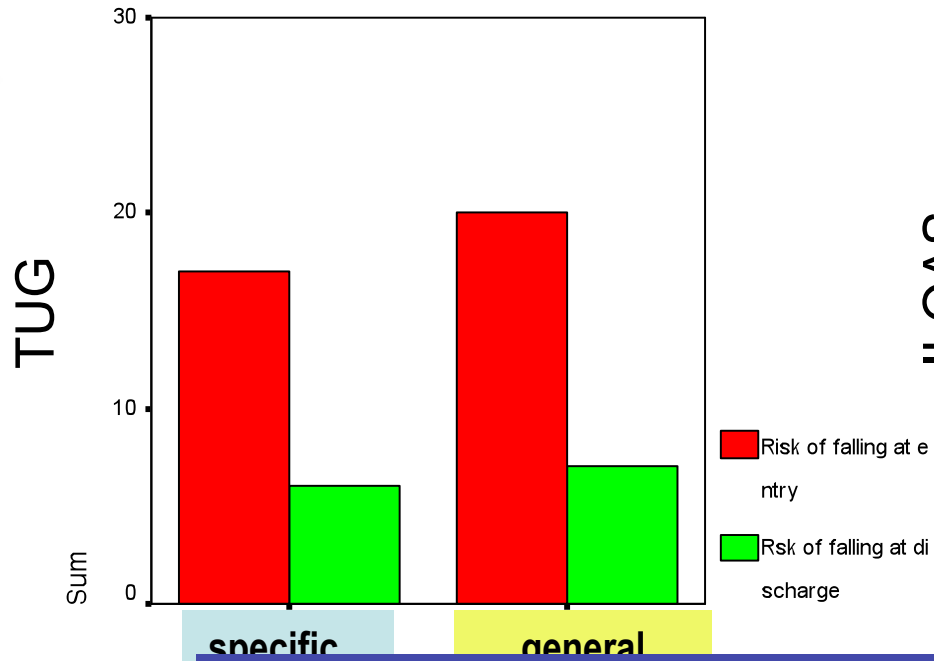


# Performance based measurements

**ILOAS**

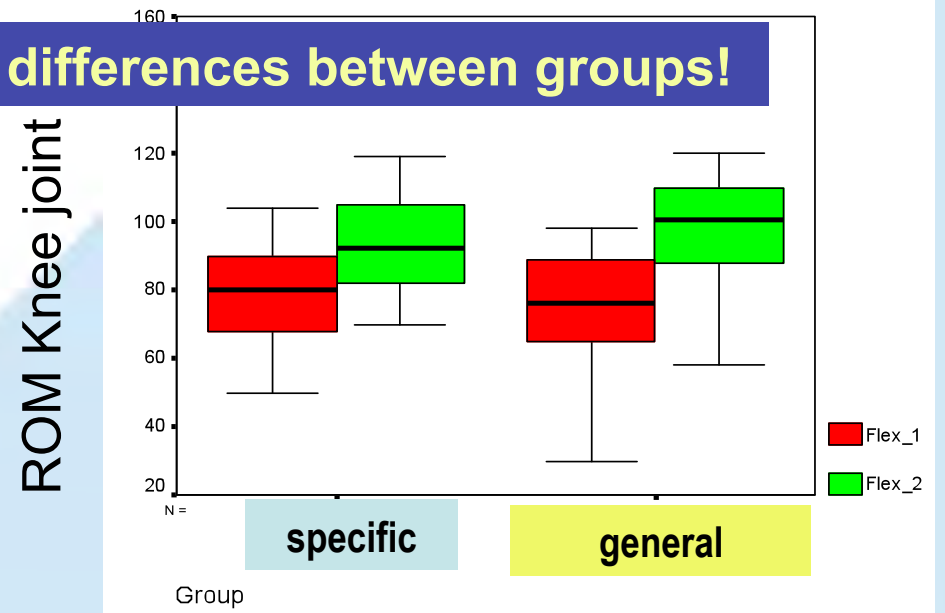
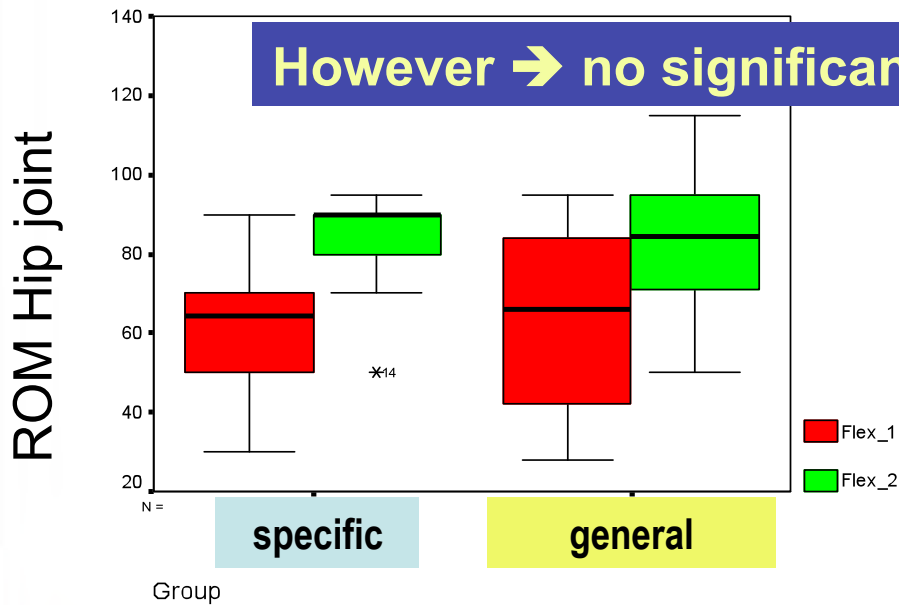
**TUG**

**Active range of motion**



**Highly significant differences from entry to discharge!**

**However → no significant differences between groups!**



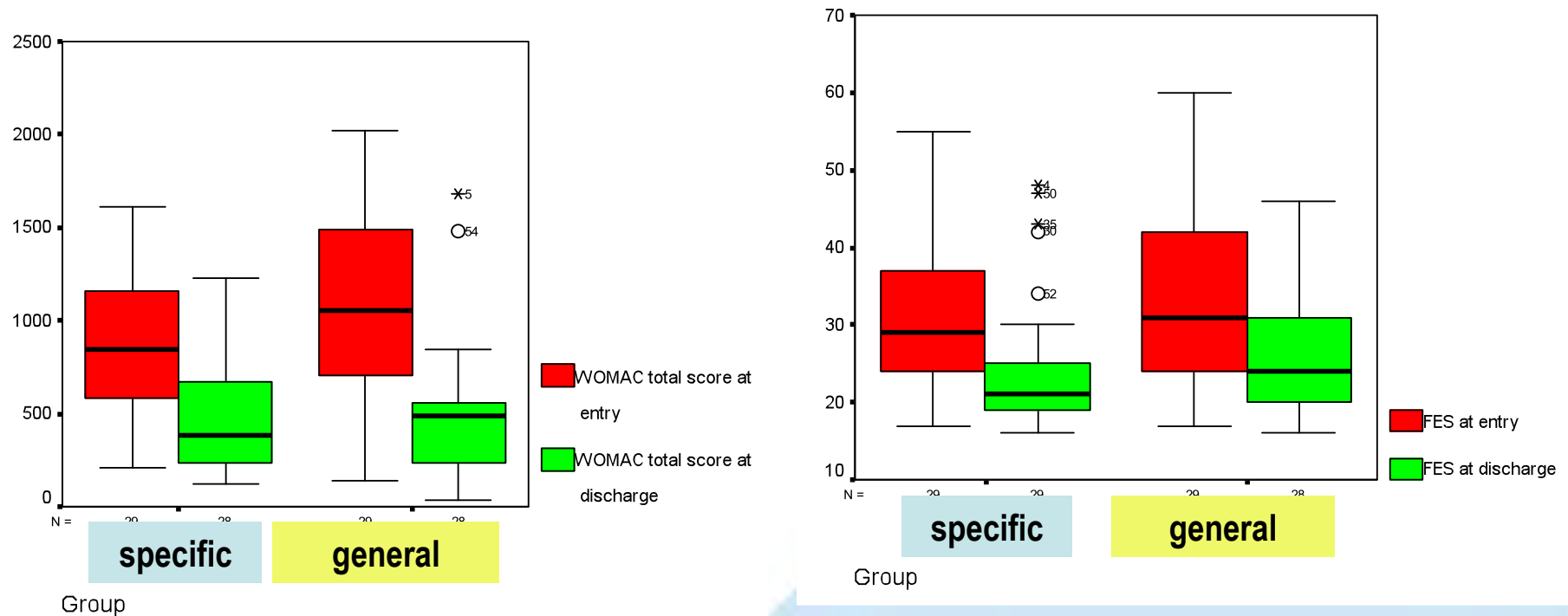
# Patient centred outcomes

**WOMAC**

**FES-I**

**Program evaluation**

# Symptoms, disability and fall related self efficacy at entry and discharge



WOMAC

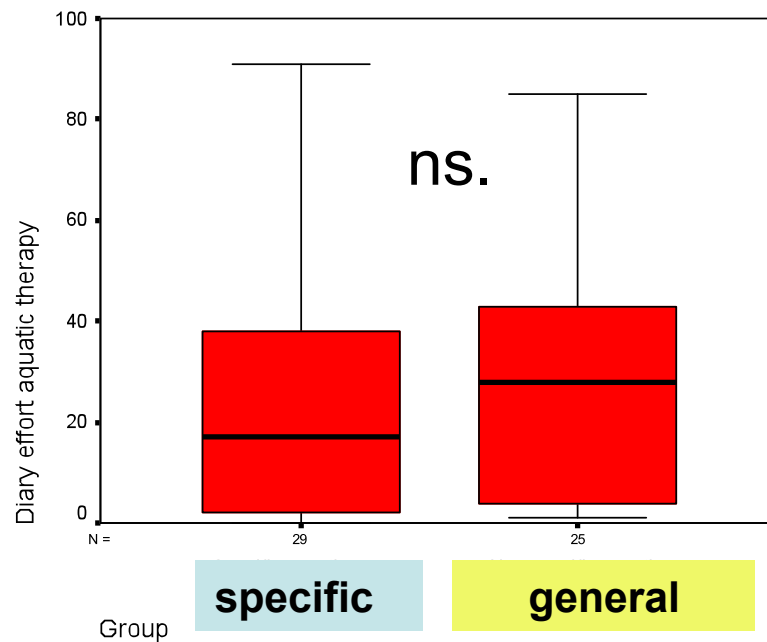
FES-I

**Highly significant differences from entry to discharge!**

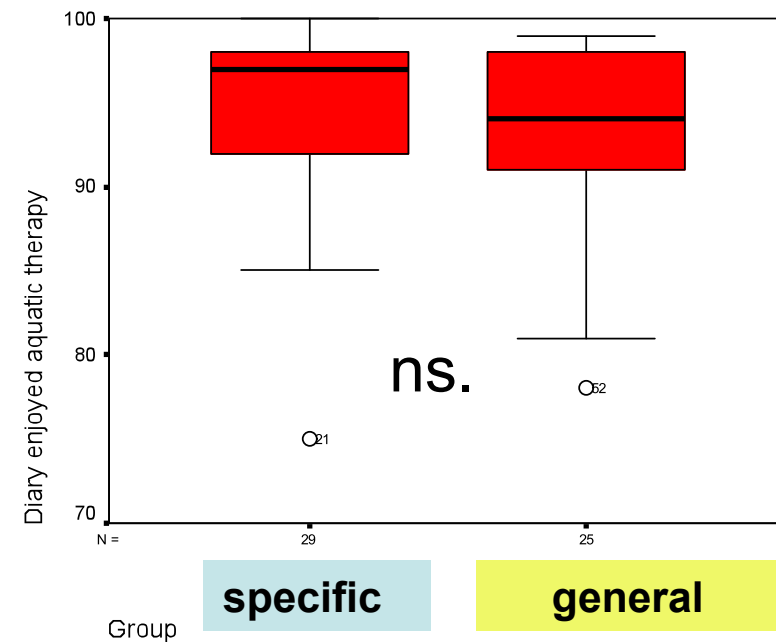
**However → no significant differences between groups!**

# Program evaluation by patients

How strenuous was the aquatic therapy?

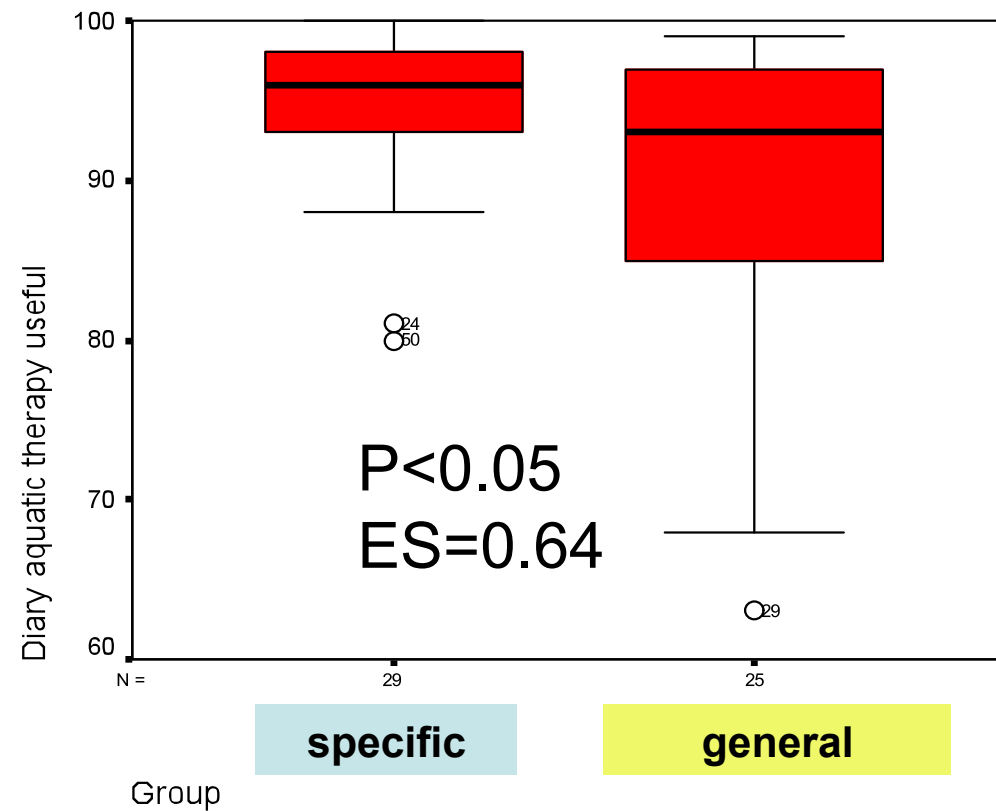


How much did you enjoy the aquatic therapy?



# Program evaluation by patients

How useful was the aquatic therapy?



# Discussion

- Rehabilitation of patients after hip- or knee arthroplasty has a significant effect on mobility, risk of falls, and quality of life.
- All measurements showed no in-between group differences on the short term therapy effects.
- The general treatment time was  $>3/4$  of the pool treatment.
- Patients evaluated the specific aquatic therapy program significantly more useful than the general aquatic therapy program.
- All patients were walking with canes. Long term effects on balance are estimated in the follow up.

# Conclusion

A specific aquatic therapy program including balance activity, weight bearing, joint mobility, muscle strength and coordination for patients after knee or hip replacement is more useful on the patients view than a general aquatic therapy program excluding balance activity and weight bearing.