

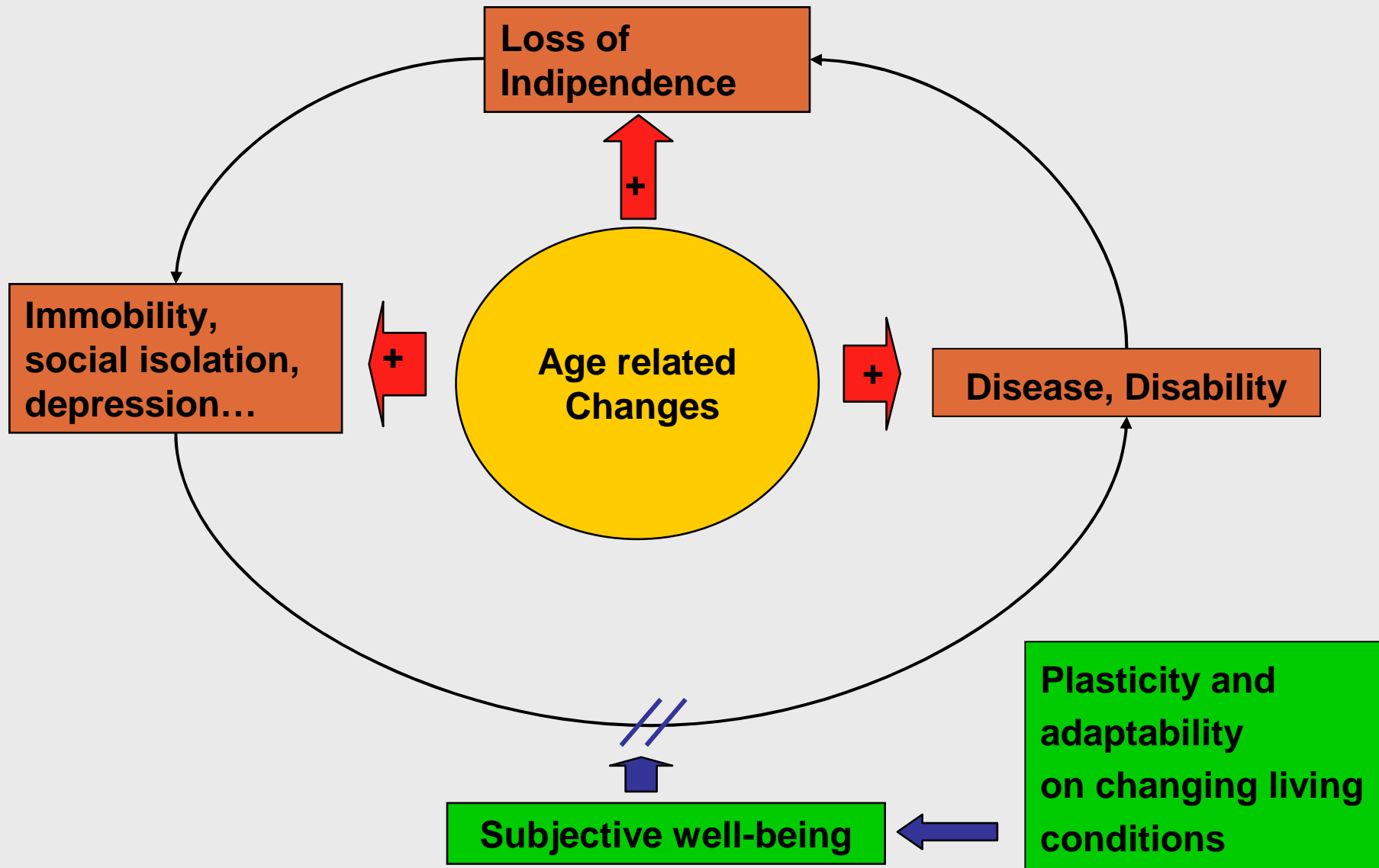
# Usability of a sensor based home stroke rehabilitation system for the upper limb

**CHARITÉ**  
UNIVERSITÄTSMEDIZIN BERLIN

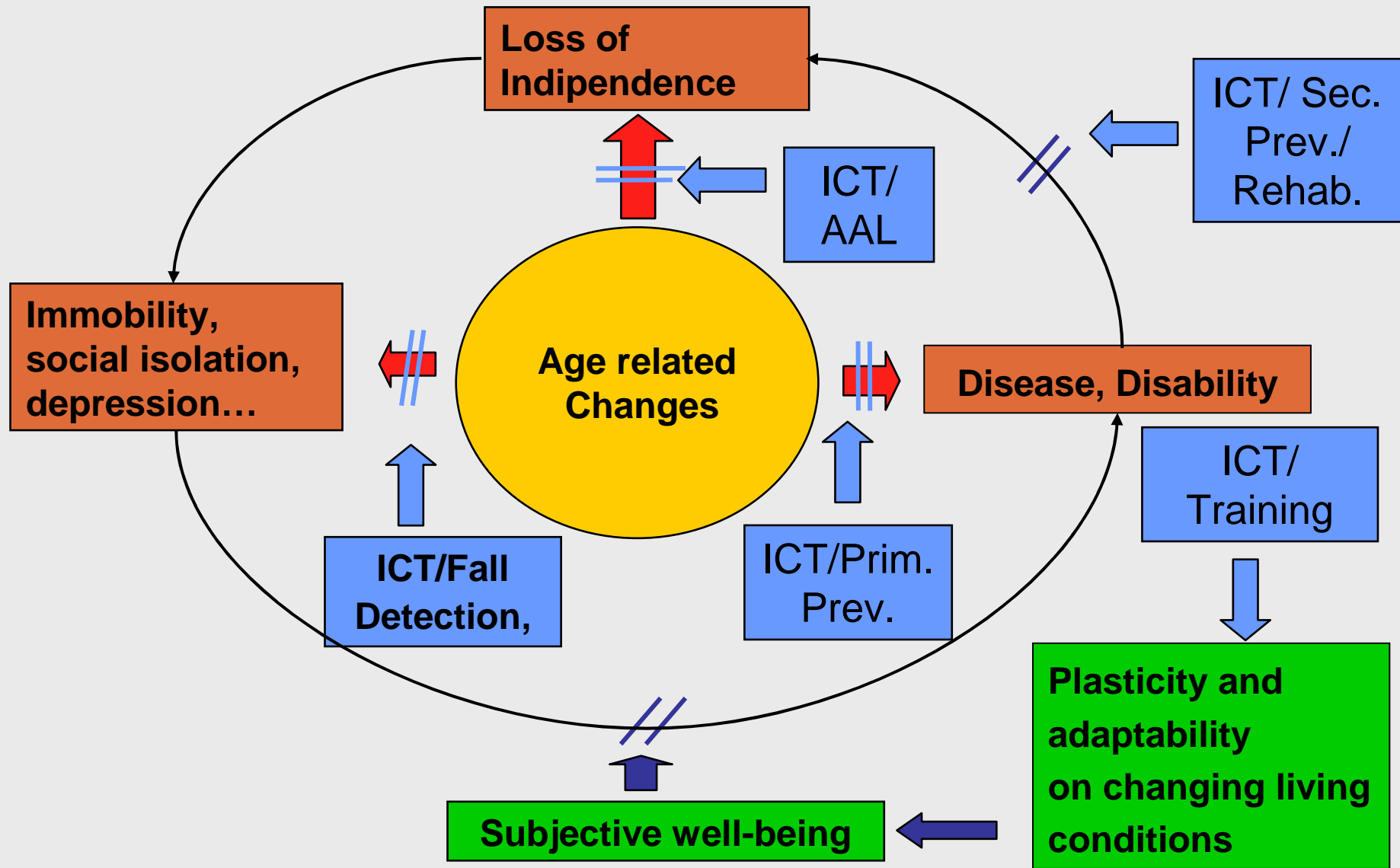
M. Gövercin

Geriatrics Research Group Charité –  
University Medicine Berlin,

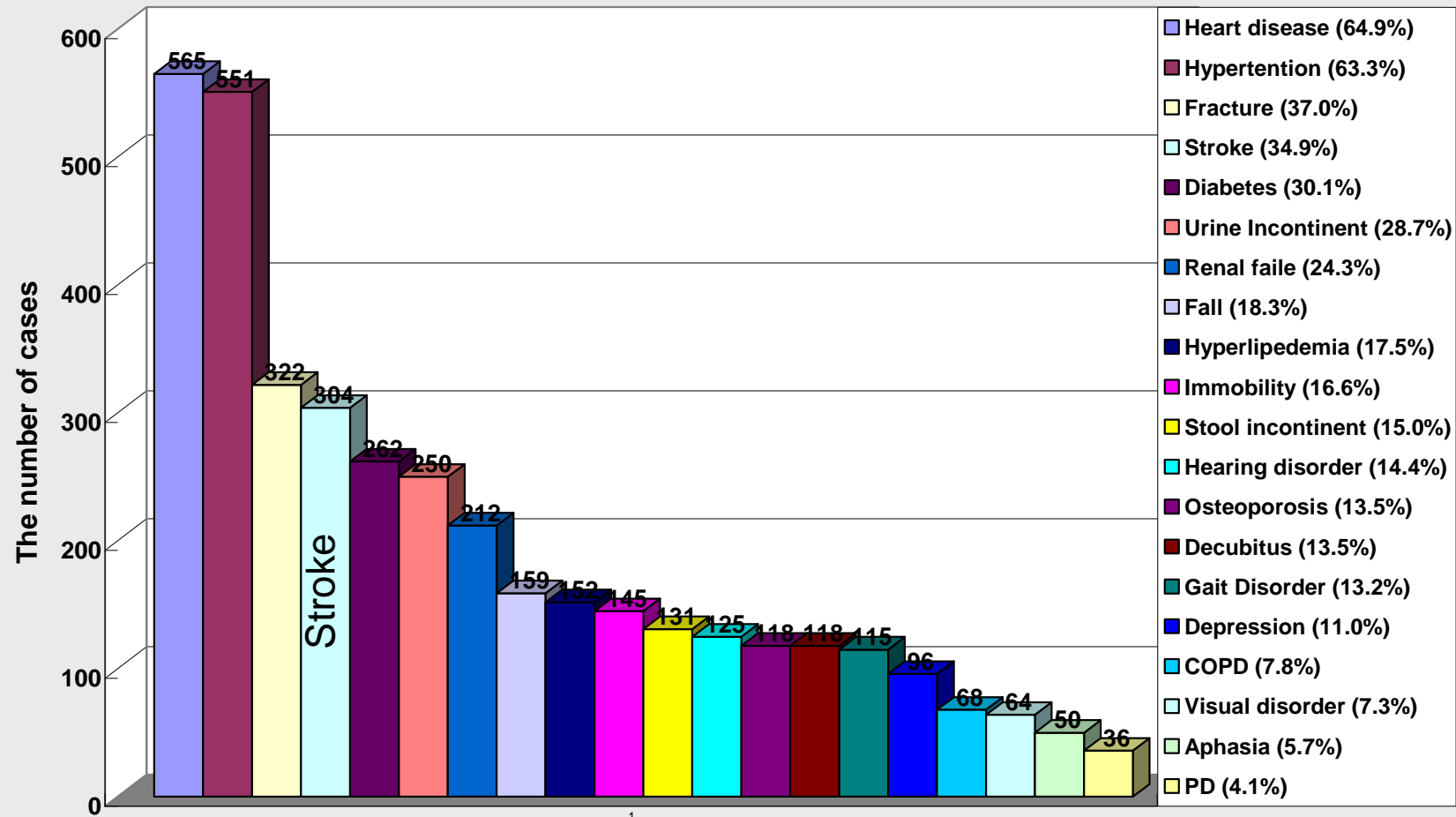
# Initial Position I – Circulus vitiosus -



# Initial Situation II – Starting points for ICT -



# Why Stroke ? – Fourth leading Comorbidity in Geriatric Patients (EGZB)



# Why Stroke? II

- Stroke is the third leading cause of death
- cause of serious long-term disability for its survivors
- Over 80% of stroke patients suffer from unilateral sensor motor deficits (hemiparesis)
- Stroke patients have not reached their full potential when they are discharged from acute hospital <sup>2</sup>
- Especially elderly people can not easily profit from outpatient therapy because of impaired mobility, cognition and lacking resources (aggravation in near future) <sup>3</sup>
- Guided home rehabilitation lead to improvement in motor learning <sup>22</sup>

<sup>2</sup> Malouin Butterworth Heinemann 185-222

<sup>3</sup> Tylor Clin Rehabil. 2000

<sup>22</sup> Duncan Stroke 1998

# Usability of a sensor based home stroke rehabilitation system for the upper limb

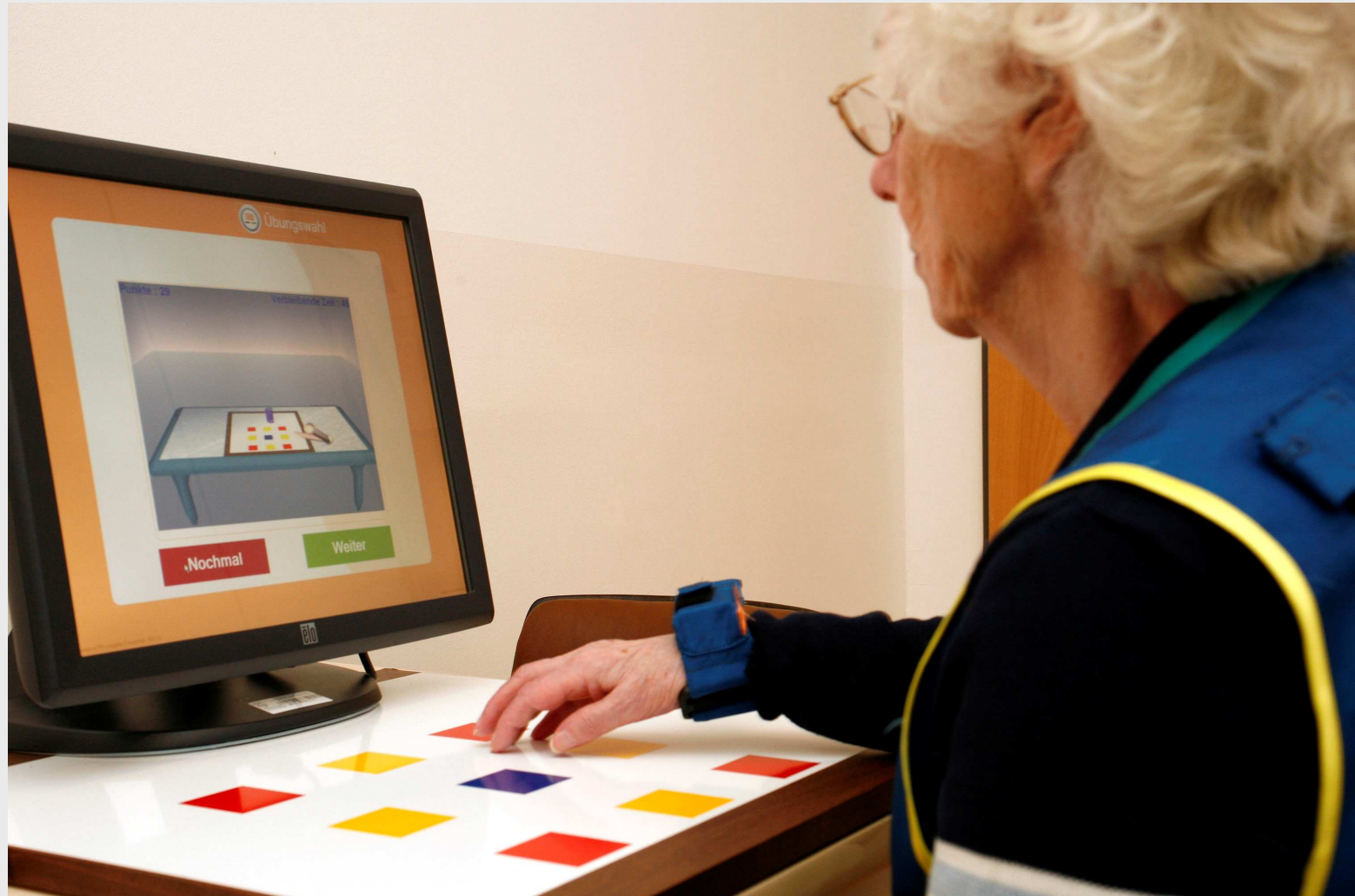


- Study design: Feasibility study
- Primary objective: Feasibility (USE/CSUQ questionnaire)
- Secondary objectives: Safety, Motor Learning (Fugl-Meyer-Score), algorithm development for motion tracking (automatic evaluation and feedback)
- Study population: 15 subjects
- Sensors: Forearm, upper arm, chest, wireless connection to laptop, touchscreen

# Inertial Sensor Network for Wireless Assessment of Body Movements and Simultaneous Demonstration with Avatar



# Basic Serious Gaming – „Virtual Rehabilitation“

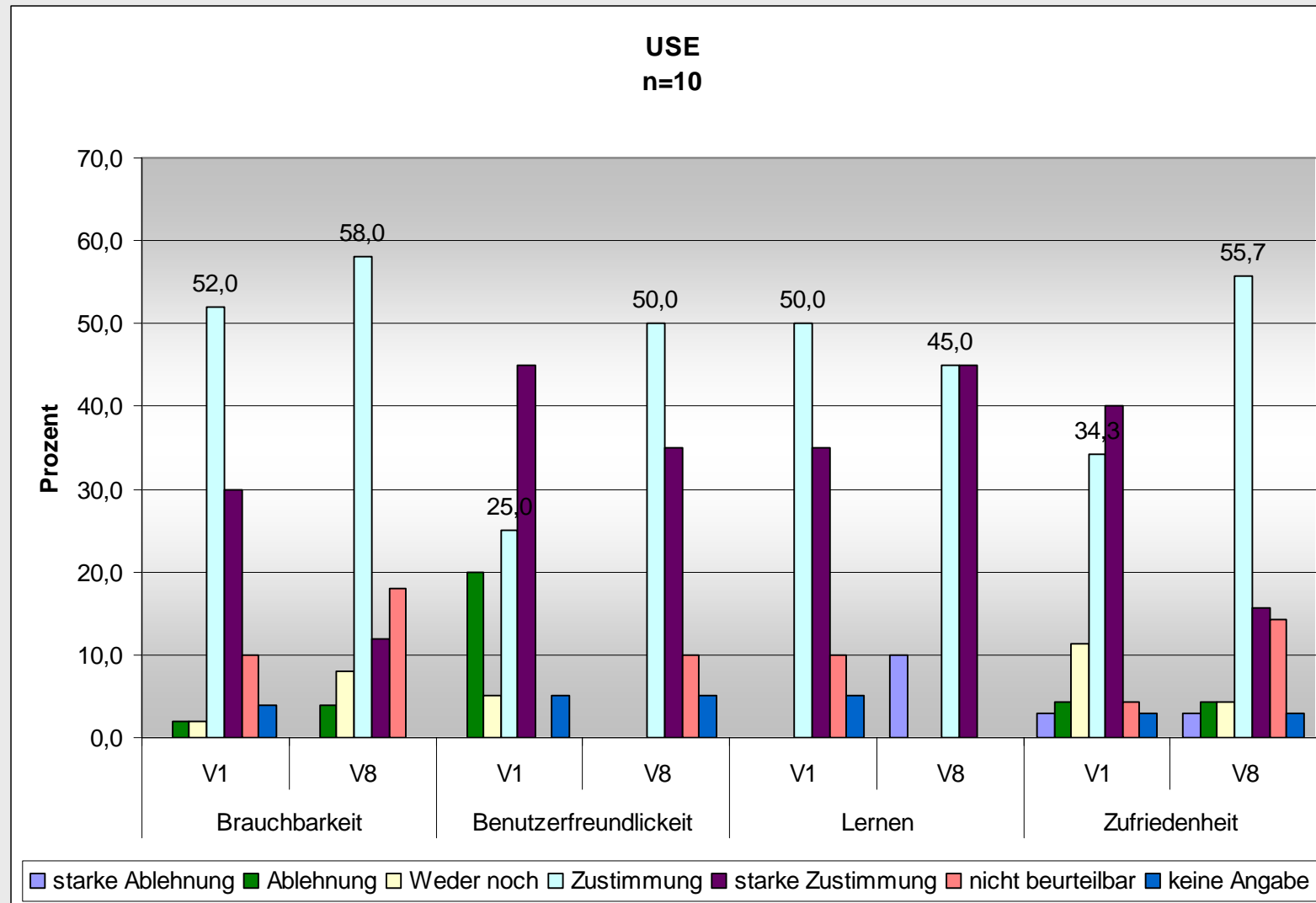




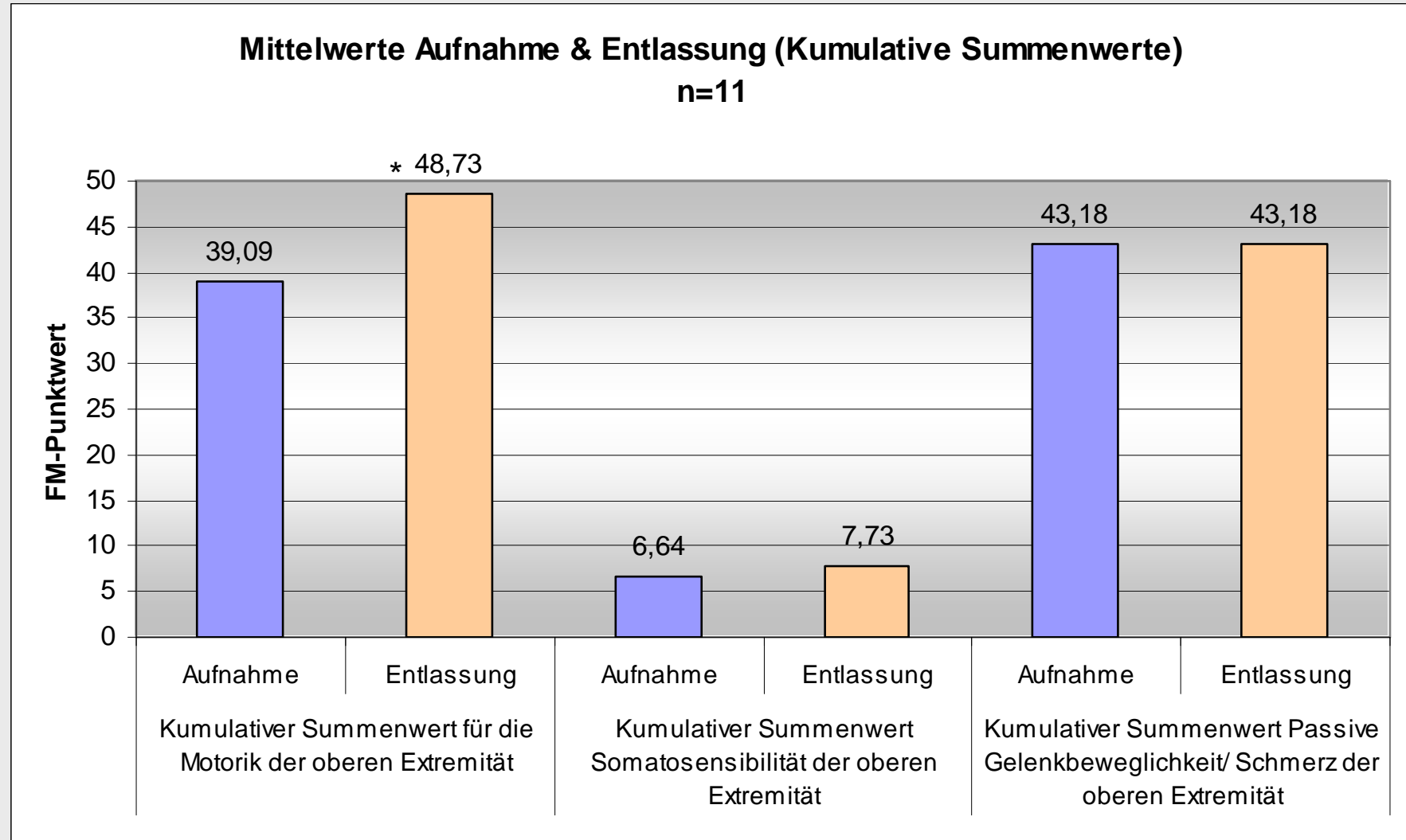
# General

	N	Minimum	Maximum	Mittelwert	Standardabweichung (SD)
Gender	15	1	2	1,73	,458
Age	15	60	90	76,29	8,713
Height [cm]	15	150	175	164,20	6,868
Weight [kg]	15	48	107	73,13	19,224
Barthel-Index Admission	15	10	75	39,67	20,042
Barthel-Index Discharge	6	35	75	51,67	17,224
MMSE	15	16	29	23,27	4,148
GDS	15	0	6	2,87	1,506

# Results for Usability - modified USE Questionnaire



# Motor Learning - Fugl-Meyer Scores



\*p<0,05

# Summary Rehabilitation Exerciser

- Is Usable for elderly people (mod. USE-CSUQ-Question.)
- Is widely accepted by multimorbid stroke patients
- Seem to improve motor learning (Fugl-Meyer)
- Needs further interface and wearable sensor development for usability in home environments (Geriatric Research)
- Needs further simplification for cognitive impaired people
- Needs further evaluation of therapeutic efficacy (RCT)
- Needs implementation strategies for health system

Thank You for Attention