



vCare Final Event
Bruxelles 29 August 2022

The vCare stories and promise

STROKE USE CASE PRESENTATION AND FINAL RESULTS



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Agenda

- Background of stroke use case
- Methodology of the pilot stage
- Results
- Talking points and next challenges
- Patient's point of view

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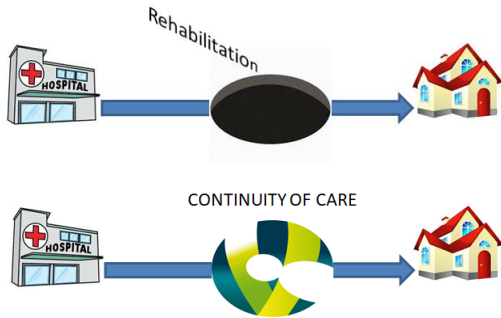
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Background of stroke use case



Where does vCare fit?



- Interruption of rehabilitation pathway upon discharge
- Unhealthy lifestyle at home
- Risk of future relapse

- vCare provide a remote home rehabilitation service
- VC empower motivation and stimulate physical/cognitive activity
- Reduction of health decline in stroke outcomes

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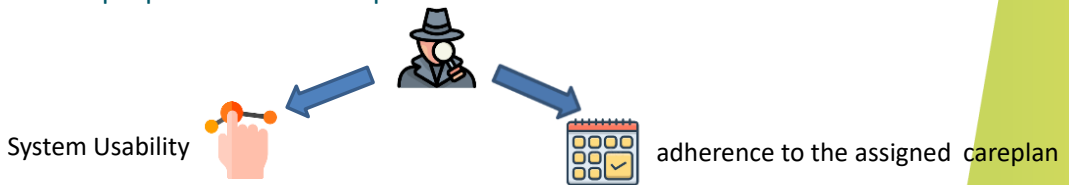
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Background of stroke use case



What is the purpose of the vCare pilot?



ENGAGEMENT

The Challenges

- Empower motivation
- Support active and independent lifestyles at home
- Transfer process from Healthcare Professionals to vCare solution in a continuum of care
- Reliability of the vCare components in terms of features suitability for stroke users

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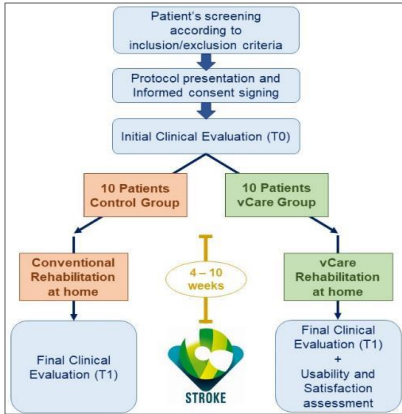


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Methodology of the pilot stage

Study design



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T0 and T1 Clinical evaluation

USE CASE	SCALES
STROKE - CCP	EQ-5D (Euro QoL-5 Dimension)
	NIHSS (National Institutes of Health Stroke Scale)
	FIM (Functional Independence Measure)
	FAC (Functional Ambulation Classification)
	MoCA (Montreal Cognitive Assessment)

T1 Usability and satisfaction assessment

USE CASE	SCALES
STROKE - CCP	UEQ (User Experience Questionnaire)
	SUS (System Usability Scale)
	TAM (Technology Acceptance Model)

T1 Parameters tracked by the vCare system

USE CASE	OUTCOME MEASURES
STROKE - CCP	Number of steps
	E-learning video tutorial adherence
	Time spent in motor/cognitive rehabilitation
	Interactions vCare platform/user
	Access to vCare apps
	Adherence to sessions prescribed

Only vCare group



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Methodology of the pilot stage

Activities and frequencies tested for Stroke Use Case matched with App and devices used

ACTIVITY	APP	DEVICE
Motor serious games (A1) 3Times/Week	Neuro Rehabililty suite	Set top box 3D Camera TV
Daily number of steps (A2) Always ON	Xiaomi MiFit vCare Avatar App	Wristband Tablet
Video tutorials promoting physical exercises and educational contents for risk factor reduction (A3) On Demand	vCare Avatar App	Tablet
Cognitive serious games (A4) 2Times/Week	Cognitive Rehabililty suite	Tablet
Virtual coaching Always ON	vCare Avatar App	Tablet



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Results

Patients characterization

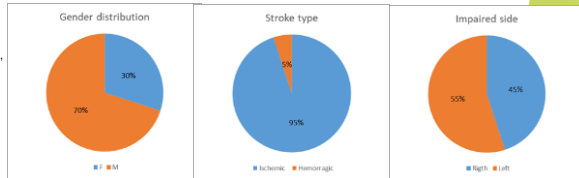
Enrolment criteria:

- Stroke (ischemic or haemorrhagic) accident confirmed by CT and/or MRI brain;
- NIH Stroke Scale (NIHSS) ≤ 14 (i.e., mild to moderate neurological impairment);
- Age over 50;
- Availability to interact with digital devices;
- High-speed internet connection (i.e., DSL or higher);
- TV with HDMI port.

- 20 subjects:
- 14 M 6 F
- 72.4 ± 10.2 mean years old
- 35.7 ± 63 months elapsed by stroke event

Exclusion criteria:

- Global aphasia;
- Moderate to severe cognitive impairment documented by a MMSE≤22;
- Evidence of a severe clinical condition affecting study participation (e.g., head trauma, ongoing oncological, hepatic/renal, psychiatric severe condition or acute infection);
- Incapacity to understand the study and provide informed consent;
- Refusal to sign the informed consent.



Monitoring duration for each group

	TOTAL DAYS [DAYS]	TOTAL WEEKS [WEEKS]
EG (n=7)	40.43 ± 14.18	6.00 ± 2.00
CG (n=9)	40.89 ± 11.94	6.56 ± 1.59
All Patients (n=16)	40.69 ± 12.46	6.31 ± 1.74

	NIHSS	FIM	FAC	MoCA
	[42-0]	[18-126]	[0-5]	[ES 0-4]
mean	3.2	109.1	3.8	2.0
st. dev	1.8	13.7	1.2	1.4

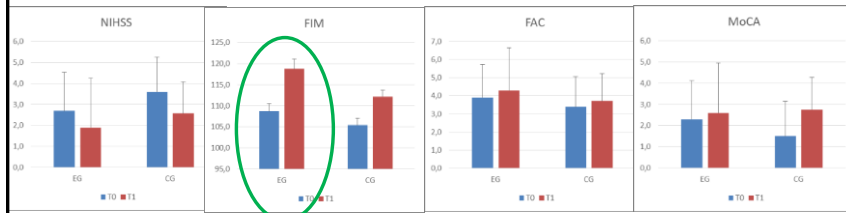
Mild neurological impairment



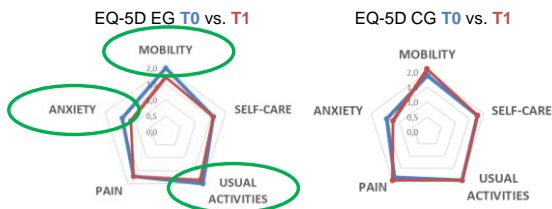
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Results

Clinical Evaluations Experimental group vs Control Group



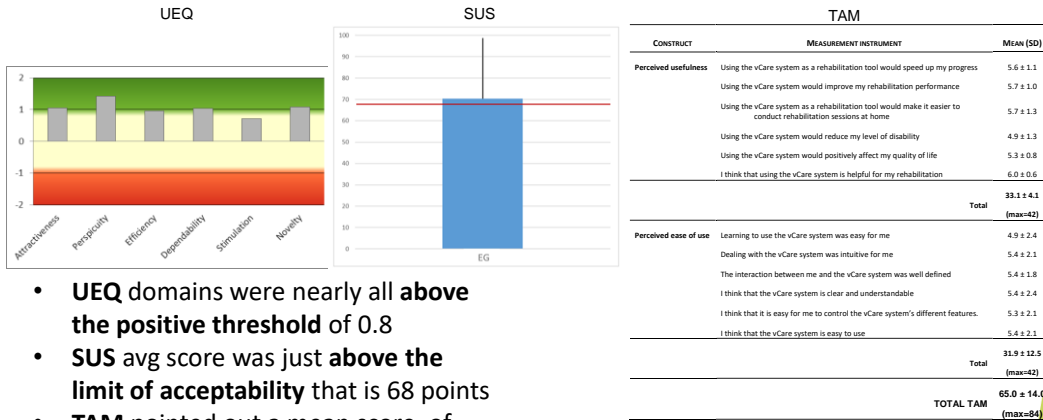
- Mild stroke patients
- Both groups **trend is positive** but more consistent in the **vCare group** especially from a functional POV (FIM)
- **vCare positively impacts QoL 5D** particularly in mobility, anxiety and usual activities domains



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Results

Usability and Satisfaction assessed by vCare users



- **UEQ domains were nearly all above the positive threshold of 0.8**
- **SUS avg score was just above the limit of acceptability that is 68 points**
- **TAM pointed out a mean score of 65/84 (77% of maximum value reachable)**



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Results

Outcome measures overview matched within vCare group subjects

Parameter	Monitoring duration	vCare Avatar App				A1 – Home base Motor Activities			A2 – Coaching for an Active Lifestyle		A3- e-learning		A4 – Home base Cognitive Games			
		Avg interactions	Adh in using vCare	Avg Accesses	Active sessions	Total time	Avg time	Adh %	Adh in wearing wristband	Avg steps	Adh in using vCare %	Avg video tutorial	Active sessions	Total time	Avg time	Adh %
Unit	#	#	%	#	#	'	'	%	%	#	%	#	'	'	%	
PAT 02	52	5,75	86%	2,17	15	272,43	15,14	71%	31%	1331	-	-	20	364,70	18,24	100%
PAT 04	42	3,67	71%	2,00	2	55,98	27,99	11%	14%	1377	50%	1	14	186,25	13,30	100%
PAT 05	35	17,40	71%	3,40	11	58,97	4,91	73%	23%	4685	100%	3	12	66,95	5,58	100%
PAT 06	66	41,50	91%	8,20	42	1449,70	34,52	100%	59%	3674	80%	6,13	46	629,45	13,68	100%
PAT 07	31	11,20	63%	3,40	6	69,37	11,56	40%	39%	446	20%	4	31	411,52	13,27	100%
PAT 09	31	44,40	83%	8,20	19	511,10	26,90	100%	94%	4989	40%	3,50	25	285,10	11,40	100%
PAT 10	26	8,67	43%	2,33	-	-	-	-	42%	390	25%	3	5	11,97	2,39	63%
mean	40,43	18,94	73%	4,24	15,83	402,925	20,17	66%	43%	2413,08	53%	3,44	21,86	279,42	11,13	95%
std	14,18	16,99	16%	2,76	14,19	543,03	11,35	35%	26%	1982,99	32%	1,67	13,68	213,16	5,38	14%

- **A4- Home based Cognitive Games** show an excellent adherence in prescribed sessions (95%±14)
- **A1-Home based Motor Activities** moderately engage the patients(66%±35)
- Weekly **vCare Avatar App** adherence is good (mean 73%±16)
- Adherence in **A2-Coaching for an Active Lifestyle** was at least 39% for half the patients
- The average adherence in watching **A3- e-learning** video was more than 50%



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std	± 14,18	± 16,99	± 16%	± 2,76	± 14,19	± 543,03	± 11,35	± 35%	± 26%	± 1982,99	± 32%	± 1,67	± 13,68	± 213,16	± 5,38	± 14%		

For each metric the colour blending indicate from the best (green) to the worst (red) performance in terms of engagement.

- Overview is a **junction between adherence and usability performance**
- Individual fluctuations in metrics ratings = **motivational variability**



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Talking points and next steps

CLINICAL EFFECTIVENESS

- Identify which clinical requirements are necessary to maximize the benefits of a virtual coach-mediated rehabilitation service for stroke
- Establish the most appropriated outcome measures to prove a minimal clinically/statistically significant pre- and post-intervention difference
- Identify a clinical study timeframe consistent with the acquisition of the necessary sample size

- Age
- Dexterity and balance impairment
- Cognitive decline
- ADL independence
- TUG
- 10 MtWT
- 6mWT
- 6M/1Y

STROKE PROFILE RECOMMENDED



QUANTITATIVE CLINICAL METRIC




GOOD CLINICAL PRACTICE



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Talking points and next steps



USABILITY

- Identify commercially available or dedicated devices that best tailor their accessibility to the motor and cognitive disabilities observed in stroke population
- Consider an optimization of the accessibility options
- assessment of the environmental and infrastructural conditions existing in the patients' home context to be suitable with the devices selected

- Input systems
- Display size
- Device dimension
- GUI simplification
- Single buttons for multi tasking operations
- DSL/FTTC/FTTH network
- Safe and free work spaces


HARDWARE MARKET ANALYSIS

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SOFTWARE OPTIMIZATION

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ENVIRONMENTAL REQUIREMENTS



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Talking points and next steps



ADHERENCE


- Support patients' learning curve in using technological devices
- Ongoing support for patients' motivation level

- Individual and intensive educational programs
- By phone or physically

TEACHING AND TUTORING

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MOTIVATIONAL REINFORCEMENT



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Patient's point of view



Giuliana 87 years old
Left side hemiparesis:

**«I'm very happy that i took part
in vCare»**

let's see what she has to tell us...

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Thanks for your attention

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