


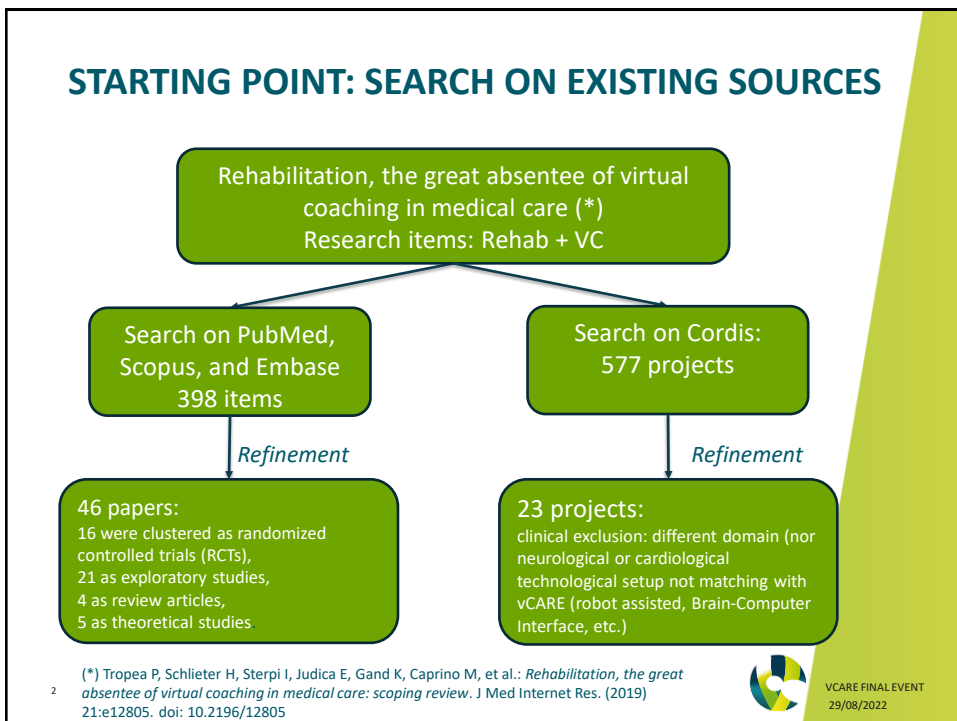
vCARE
VIRTUAL COACHING ACTIVITIES
FOR REHABILITATION IN ELDERLY

KEY LESSONS LEARNT

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VCARE: INNOVATION POTENTIAL

Key items	Evidence from benchmark with 30 EU projects / market solutions
Multi-clinical settings	It is rare to identify a project that is inclusive of more than one clinical context (i.e. a specific pathology). <u>Quality of life</u> in elderly population is the <u>common background</u> of the few projects addressing multiple clinical settings, but <u>for healthy subjects</u> .
Continuity of care	Almost all the selected projects focus on a home setting. Moreover, <u>continuity of care</u> between hospital and home is present only in about <u>half of the projects</u> .
Secondary prevention	This criterion is fulfilled by one third of the selected projects, the ones matching with the key word "rehabilitation". <u>The key word "virtual coach"</u> is never associated with this clinical approach.
Personalized Care Plan	The presence of <u>dynamic adaptation</u> is reported <u>only in four projects</u> . The dynamic adaptation is anyway specific on a single output: intensity of treatment in motor rehabilitation, compliance to the care plan, digital biomarker identification and therapy compliance.
Extended Quality of Life	An extended " <u>Quality of Life perspective</u> " is applied <u>only to almost half of the projects</u> , according to a different viewpoint. The other projects focus on a specific item, like risk factors prevention, fall detection, cognitive decline, a single motor deficit or a specific body district.

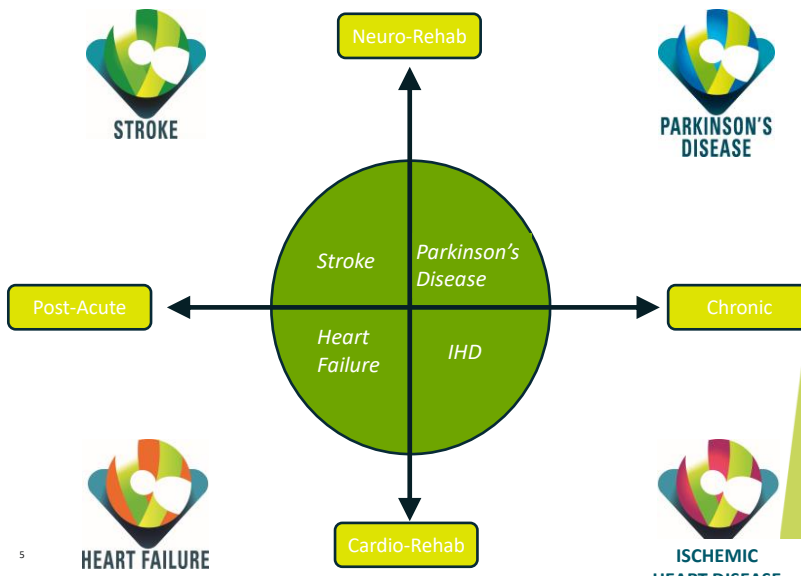
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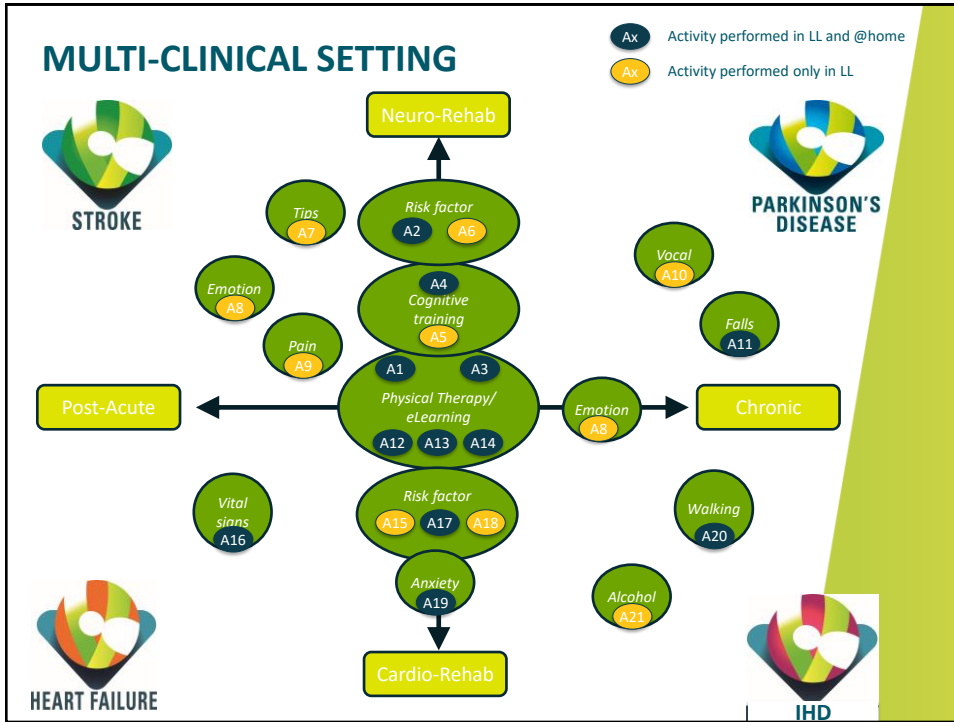
MULTI-CLINICAL SETTING



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CONTINUITY OF CARE (ADHERENCE)

Secondary Outcomes		Pathology	
		STROKE	PD
Total n. of times patients carry out an activity suggested by the vCare (A1/A4)	Min. 70% of the proposed activities are followed by min. 80% of patients	<ul style="list-style-type: none"> ✓ 85% of patients performed >70% of <u>cognitive games</u> during the monitoring period (total score 95%) ✗ 66% of patients performed >70% of <u>motor games</u> during the monitoring period (total score 73%) ✗ 71% of patients performed >70% of vCare Avatar App activities 	<ul style="list-style-type: none"> ✓ Regarding <u>cognitive games</u>, 4 patients showed an adherence of 100%, the others >88% ✓ All patients showed an adherence for <u>motor games</u> >88%

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CONTINUITY OF CARE (ADHERENCE)

Secondary Outcomes		Pathology			
		STROKE	PD	HF	IHD
Adherence in playing games (A1/A4)	planned v/s played	Motor: 66% Cognitive: 95%	Motor: 92,7% Cognitive: 96,6%	Motor: 43%	Motor: 45%
Adherence in wearing the wristband (A2)	day wristband / total days	Total adherence score: 43%	Total adherence score: > 90%	Total adherence score: 16%	Total adherence score: 26%
Adherence in e-learning	At least once a week	<ul style="list-style-type: none"> ✓ 85% of patients watched at least one video per week ✓ 85% of patients watched at least 3 videos during the monitoring period 	<ul style="list-style-type: none"> ✓ 3 patients showed 100% adherence ✓ One patient showed 83.33% adherence ✗ 4 patients showed adherence <50% 	✗ Not all patients looked at all e-learning materials	✗ Not all patients looked at all e-learning materials

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ADHERENCE: LESSONS LEARNT

DO

Scheduled activities provide better guarantee of compliance

Adherence should be set as an objective (neurological or cardiological)

Automatic reasoning (with reminders) and remote monitoring are good supporting actions

DON'T

Role of the Virtual Coach to be reinforced in non-predetermined activities

Coaching «lifestyle» is still on the fly...

Technical issues have great impact on adherence

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SECONDARY PREVENTION (RISK FACTORS)

Secondary Outcomes		Pathology			
		STROKE	PD	HF	IHD
Daily n. of steps	10% increase (T0 v/s T1)	X No significant increase between the beginning and end of the home rehabilitation program ✓ On average, patients performed around 2400 steps per day	X No significant increase of avg. walking minutes ✓ 62.5% of patients presented a significant improvement in their fluidity (in PD, very relevant parameter)	✓ The average n. of steps increased by 32%. ✓ On average, patients performed around 2476 steps per day.	✓ The average number of steps increased by 32%
Time devoted to exercise	10% increase (T0 v/s T1)	✓ Motor games: increased by 12% (accomplished / prescribed) ✓ Cognitive games: increased by 11%	N/A	✓ Increased by 12%	✓ Increased by 12%
Changes in weight	Close to normal BMI			X The objective of reaching a normal BMI was not reached	
Medication adherence	< 140/90 mmHg			✓ All patients maintained blood pressure <140/90 mmHg	
Cholesterol levels	> 10% of reduction			✓ Decrease by 30%	✓ Decrease by 27%

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RISK FACTORS MODIFICATION: LESSONS LEARNT

DO

Results in Clinical scales correspond to risk factors modification measurement:

Stroke: + FIM = + mobility
 PS: + ADL = + fluidity
 HF: - LDL = better monitoring
 IHD: + VO2max = + mobility

DON'T

Difficult to measure the change in behaviour

Virtual coach had an active role in monitoring/alerting, but the full functioning of the key feature of pathway adaption would have helped

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PILOT TEST: OUTCOMES (PERSONALIZATION)

Secondary Outcomes		Pathology			
		STROKE	PD	HF	IHD
Personalization and health promotion	X Adaptation of pathways	>60% refinement rate of rehab. therapy			
	~ Adaptation of daily n. of steps	>60% refinement rate of rehab. therapy			
	~ Adaptation of e-learning materials	>60% refinement rate of rehab. therapy			

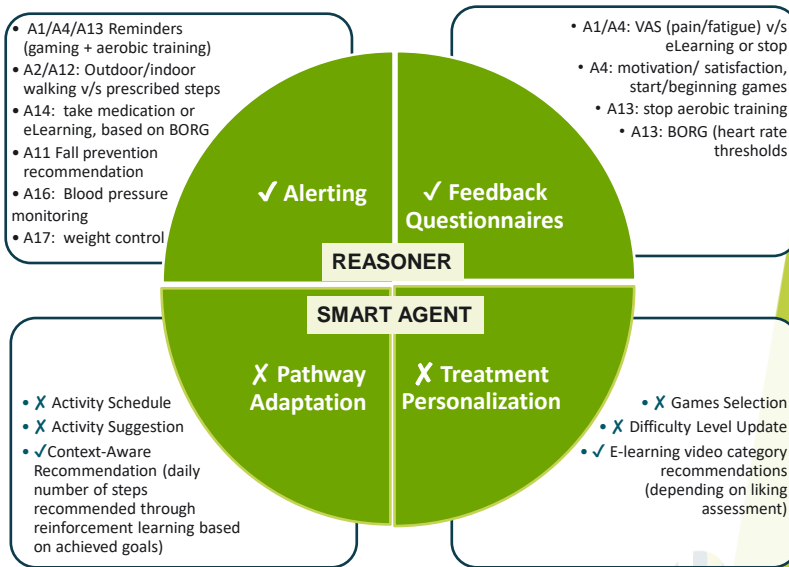
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PERSONALIZATION

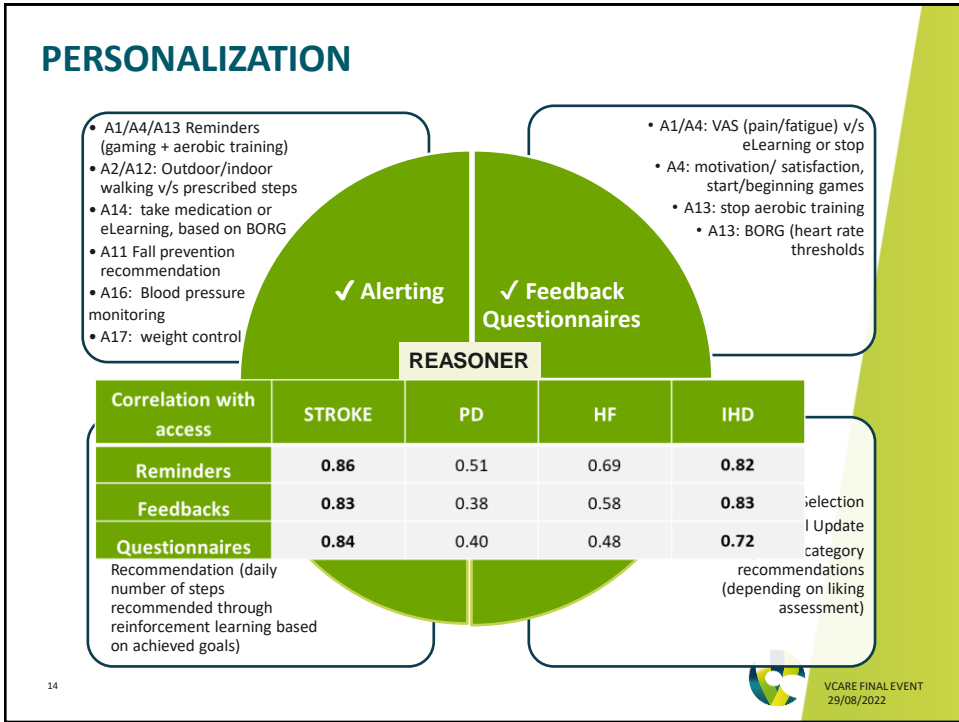


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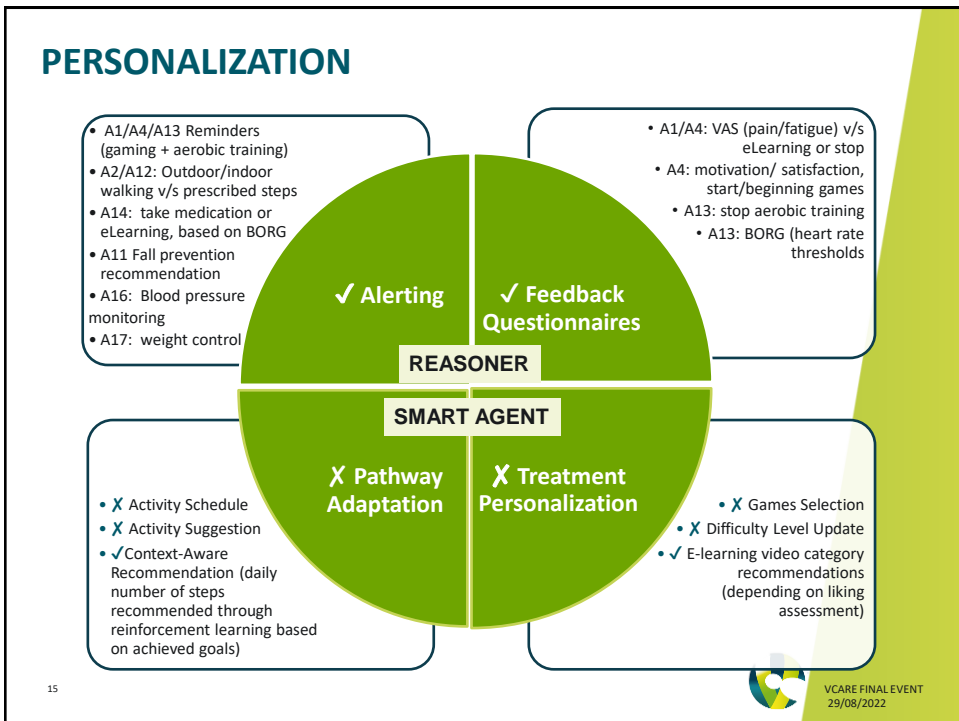


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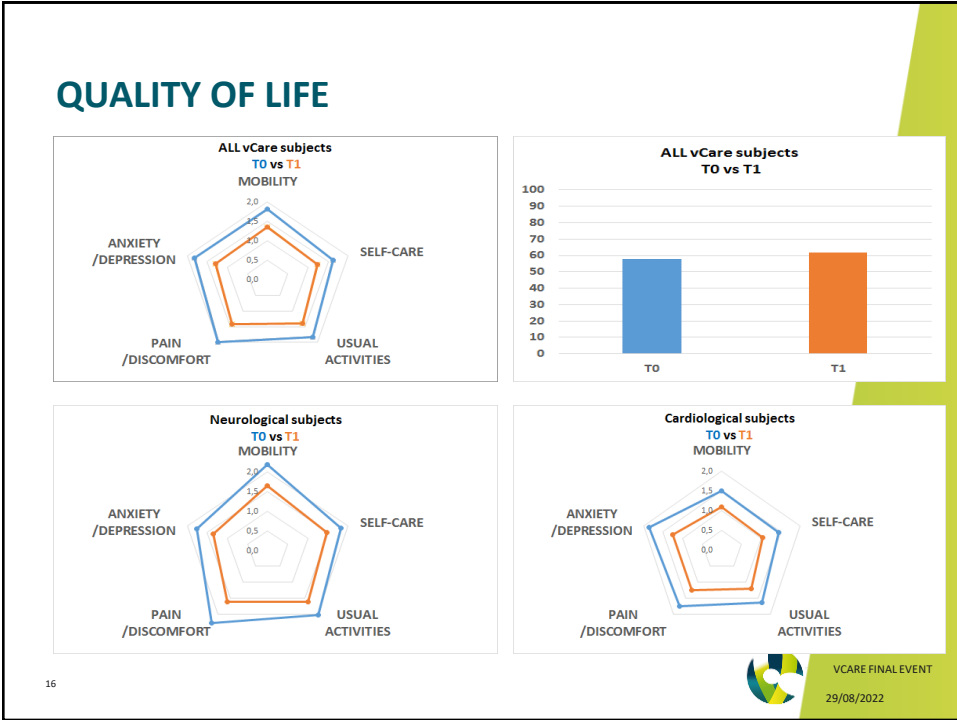
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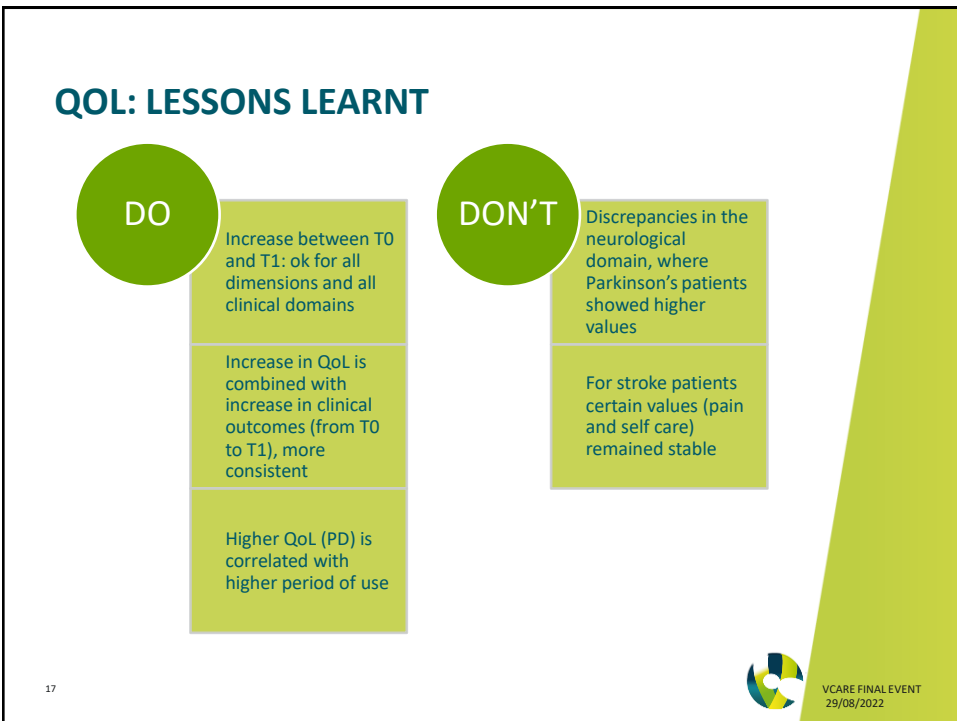
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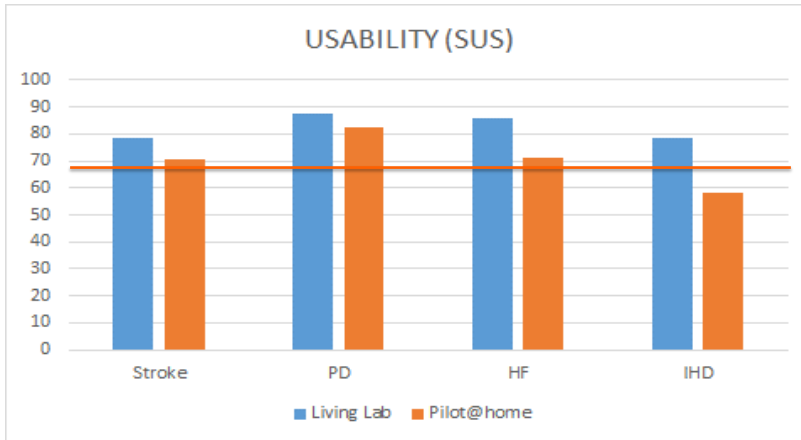
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USABILITY (SUS SCALE)

- Overall, usability was positive (> 68), with the exception of IHD
- The shift from lab to home always impacted on the usability



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USABILITY: LESSONS LEARNT

DO

Participatory design as a starting point and design by ethics as driver of the clinical study

Virtual coaching worked better with activities enhanced by contents (e.g., informative, games or videos)

Running system is manageable without great effort of technical support

DON'T

Many pathways enhanced by the VC were too deterministic > minimal avatar interaction

IoT use cases (wearable, environmental) didn't provide great support/integration with Virtual Coaching

Test phase: focus also on installation procedure

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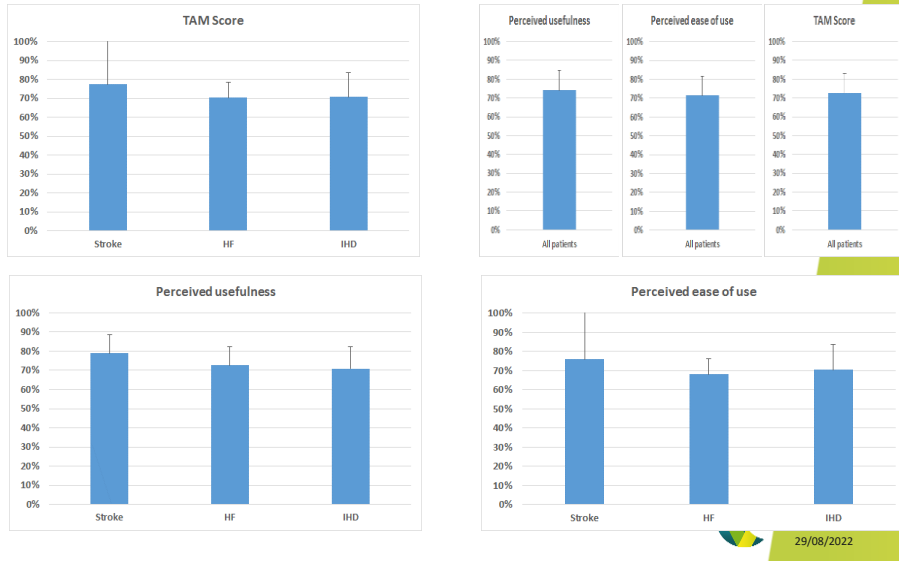


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ACCEPTABILITY

- results are in line between different pilots
- usefulness = ease of use



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ACCEPTABILITY: LESSONS LEARNT

DO

Eligibility criteria must be checked carefully in advance:

- Age (less than 70)
- Engagement
- ADL/care giver
- Living environment

Adherence is higher when the patient's health condition at discharge (T0) is better (i.e., not totally compromised).

DON'T

Machine learning needs more time to show evidence perceivable by patients

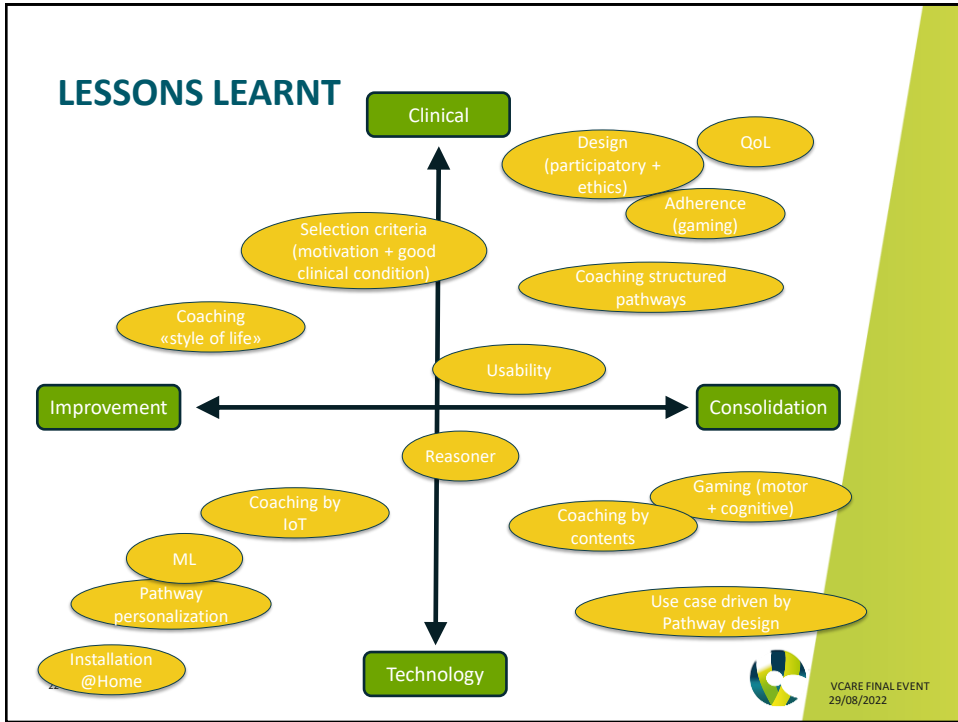
Too many drop-outs caused by failure of technologies

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