Cognitive testings on a touch-screen tablet for older adults: A feasibility study

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Purpose Digital tools are currently being developed to help with the diagnosis of neurocognitive disorder (NCD). Their use in primary care as screening tools could optimize referral to specialized teams. We aimed to develop a simple, easy-to-use neurocognitive screening tool on a touchscreen tablet to distinguish between people with major NCD, those with mild NCD and those with no NCD. We hypothesize that, depending on cognitive impairment, differences in correct responses and response times differ significantly. **Method** We implemented self-questionnaires and tasks for touch-screen tablets self-questionnaires inspired from conventional cognitive tools relevant to screen cognitive impairment. They comprised simple cognitive tasks like immediate and delayed recall of 3 words, temporal orientation questions, categorizations. Response times for tasks were also recorded. The screens have been designed to be used by the participant alone or with the help of a supervisor. Finally, we composed a battery of self-questionnaires and cognitive tasks that can be completed in 10-15 minutes. This battery was offered to 77 consecutive patients from a memory clinic and 28 volunteers without cognitive complaints recruited from a citizens' association. Cognitive diagnoses were based on DSM-5 criteria. Variables were compared using the Kruskal-Wallis test and Pearson's chi2 test and the level of significance was 0.05. **Results and Discussion** Among the 105 participants, there were 79 women (75%) and 26 men (25%) and aged 79.9 +/- 7.5 years; 40 were free from NCD, 40 had a major NCD and 25 a mild NCD. All the participants realized the full battery of tests on tablets. Success for each task and response times are shown in Table 1. Four variables were found to discriminate cognitive patient and will be combined to the battery. The feasibility of our digital tablet battery for older adults is excellent, and initial results show promising aspects for cognitive screening.

References

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Table 1. Preliminary results of cognitive tests on tablet according to cognitive status (reference diagnosis)

Success for task or response time	**Neurocognitive Disorder**			P
	none (n=40)	mild (n=25)	major (n=40)	
Success for task, n (%)				
Immediate recall	38 (95)	24 (96)	30 (75)	0.900
Delay recall	39 (98)	20 (80)	18 (45)	<0.001***
Clock recognition	29 (73)	18 (72)	25 (63)	0.575
Recognition of the flag of the country	40 (100)	22 (88)	39 (98)	0.420
Recognition of the city	37 (93)	23 (92)	37 (93)	0.997
Identify the year	40 (100)	22 (88)	32 (80)	0.130
Identify the season	38 (95)	21 (84)	31 (78)	0.790
Guess a logical sequence	32 (80)	12 (48)	23 (58)	0.190
Calculation of the months 2 months ago	38 (95)	19 (76)	26 (65)	0.004**
Categorization orange/banana	39 (98)	25 (100)	39 (98)	0.727
Categorization train/bike	39 (98)	20 (80)	36 (90)	0.064
Categorization ruler/watch	39 (98)	14 (56)	20 (50)	<0.001***
Response time, median (IQR)				
to categorize orange/banana	7 (6, 13)	11 (8, 14)	13 (9, 17)	0.042*
to categorize train/bike	7 (4, 13)	10 (5, 14)	13 (8, 19)	0.003**
to categorize ruler/watch	9 (6, 14)	12 (7, 19)	12 (7, 25)	0.110
for calculating change	34 (29, 48)	29 (24, 34)	34 (22, 49)	0.197
for calculating the date 2 months ago	22 (14, 27)	41 (27, 55)	41 (33, 61)	<0.001***

RT: response time, IQR: interquartile range ;
,,*** indicate the level of significance : <0.05, <0.01 and <0.001, respectively.*