

CANTAB Mobile: experience of use of a digital memory screening tool in primary care

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Background

- Early identification of memory complaints in clinical settings can aid identification of deficits, or reassurance, and can support care planning and management.
- CANTAB Mobile combines a sensitive touchscreen memory test, with a depression screen to differentiate symptoms in patients aged 50 – 90 years.
- It is a CE-marked, FDA-cleared and TGA-approved medical device, and is designed for use in primary care, where it has been used more than 28,000 times since 2012.
- Here we describe the results of an audit of use of this device in primary care, describing reasons for seeking testing, results and post-test routes to referral.

Methods

- CANTAB Mobile was used to administer the CANTAB Paired Associates Learning (PAL) test, an adaptive test of visuospatial memory and two optional questionnaires, the Geriatric Depression Scale (GDS-15) and activities of daily living.
- Scores on the PAL test were automatically compared to a large normative database and adjusted for age, education and gender. On the basis of this comparison, patients were categorized as having a clinically relevant memory deficit (Red), being in the borderline range (Amber) or having memory in the normal range (Green).
- Data were collated from retrospective case note review by 13 primary care practices in the UK. Practices recorded the reasons for CANTAB Mobile testing, the results, and the post-test referral.
- Data were obtained from 913 patients, tested between 2012 to 2017.



Figure 1: CANTAB Mobile in use in primary care (above) and screenshots from the tool (right). CANTAB Mobile provides assessment of visual episodic memory and learning using the Paired Associates Learning (PAL) test. The categorical results are reported relative to age, education and gender data.



Results

- Data were analysed from the subset of 892 patients where data on CANTAB Mobile outcome was available. The flow of patients from presenting concerns to diagnostic outcomes is presented in Figure 2.

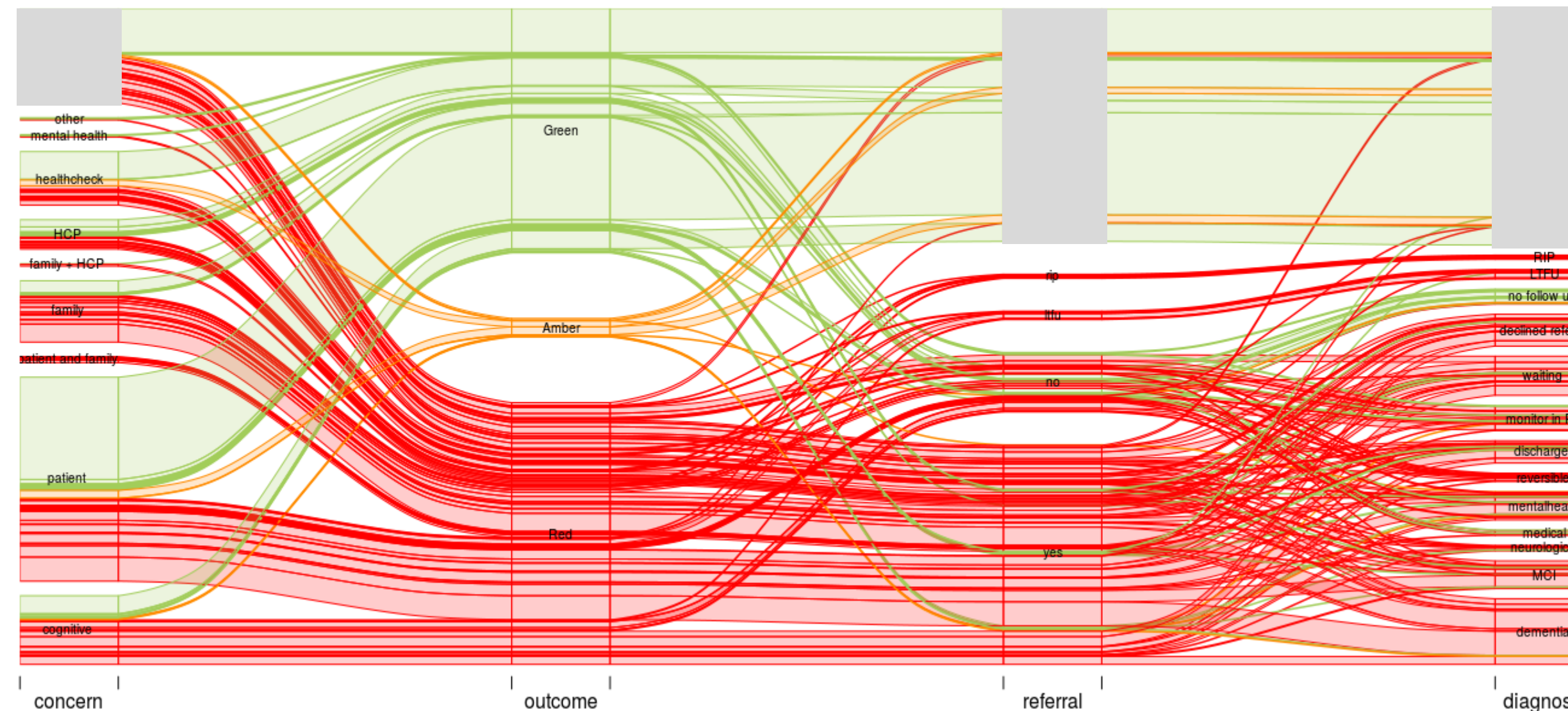


Figure 2: Alluvial diagram showing patient journey from presenting concerns (left), to the outcome of CANTAB Mobile assessment, to outcome of diagnosis on the right. Flows are coloured by CANTAB Mobile outcome, with Red indicating clinically significant memory impairment, and Green age-appropriate performance, with Amber being borderline. Grey blocks indicate missing data.

Presenting concern (n=714)

- The most common reason for assessment was patient concerns (n=339), followed by family, partner or carer concerns (n=102), and then health care professional (HCP) concerns (n=49).
- 114 had reported memory or cognitive problems, without specifying the informant. A further 89 were offered a test as part of a checkup or screening process without a statement of concern. A small number of patients (n=4) were tested as a result of expressing concerns related to mental health issues or as a baseline.

CANTAB Mobile memory outcomes (n=892)

- Significant memory problems (Red) were seen in 455 patients, 406 screened negative for memory deficits (Green) and 31 were at borderline (Amber).
- Analysis using chi-square test with FDR correction for multiple comparisons showed cognitive problems (Red or Amber category) were seen significantly more often following reports from family members ("Family", "Patient and Family", "Family and HCP"), compared to healthcheck or HCP concerns, or concerns from patients alone (Figure 3).
- Presenting complaints specifically related to cognitive problems were also more likely to result in a Red or Amber outcome compared to HCP, healthcheck or patient requested.

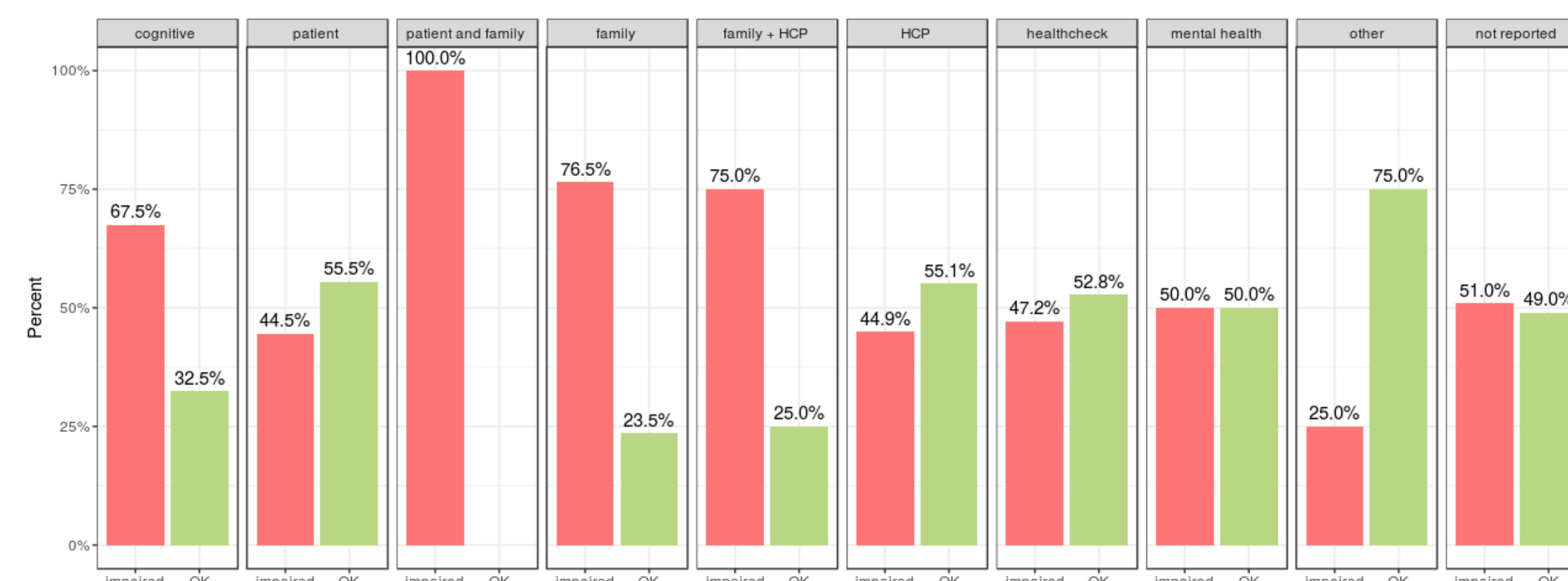


Figure 3: Bar graph indicating percentage of impaired (Red or Amber) memory performance by source of presenting concern.

Results (cont.)

Post-assessment referrals (n=485)

- Information regarding referral was available for 12% of patients with a Green outcome (n=51); 15% with Amber outcome (n=5) and 98.6% of those with a Red outcome (n=429).
- Following a Red CANTAB outcome, 341/429 patients were offered referral to secondary care. 52 of these (15.2%) declined. Twenty patients with a Green outcome were also referred to secondary care, one of which declined. All four patients with an Amber outcome who were referred accepted referral and were seen.

Diagnostic outcomes (n=499)

- Data indicating diagnostic outcomes for all patient groups are shown in Table 1.
- Data for diagnoses following a Red outcome was available for 444/455 patients. Of those assessed (n=232), either dementia or MCI were seen in 64.6% of cases.
- Other issues, such as mental health problems (depression, anxiety), medical (e.g. cancer), a reversible cause (B12, thyroid, medication side-effect) or neurological (stroke, tumor, PD) were seen in 26.7% of cases. 13.5% of those assessed were discharged back to primary care monitoring without a diagnosis.
- Data for outcomes following Green test result were only available for 50/406 (12%) of cases. The majority (n=23) received no follow up. Of the 17 which were seen in primary care, 7 (17%) had mental health issues, 1 received a diagnosis of dementia, and 3 of MCI. 3 (17%) of those assessed were discharged without diagnosis.

CANTAB Mobile outcome:	Green		Amber		Red	
	N	%	N	%	N	%
Total:	406		31		455	
Missing:	356		26		11	
No Diagnostic Information:	33		2		193	
Lost to follow up	1	3.0	0	0	15	7.8
Died	0	0.0	0	0	7	3.6
Monitored in Primary Care	5	15.2	1	50	56	29.0
No follow up	23	69.7	1	50	1	0.5
Declined referral	1	3.0	0	0	52	26.9
Waiting	3	9.1	0	0	62	32.1
Outcome available:	17		3		251	
Dementia	1	5.9	1	33.3	107	42.6
MCI	3	17.6	0	0	43	17.1
Neurological	1	5.9	0	0	8	3.2
Medical issues	2	11.8	0	0	7	2.8
Mental health	7	41.2	2	66.7	38	15.1
Reversible causes	0	0.0	0	0	14	5.6
Discharged to Primary Care	3	17.6	0	0	34	13.5

Table 1: Diagnostic outcome information for patients, stratified by CANTAB Mobile performance (Red, Amber, Green).

Conclusions

- Patient and family concerns motivated the majority of assessments with CANTAB Mobile in primary care. These concerns were followed by a positive memory screen result more frequently than assessments following HCP concerns.
- Data were available for the majority of patients following a Red CANTAB outcome, of whom just over half were referred for a secondary care assessment. In these patients, dementia or MCI was seen in 64.5% of cases. A range of other issues were diagnosed in a further 26.7% of patients, with 13.5% being discharged back to primary care monitoring without diagnosis.
- These data illustrate both the need for these objective memory assessments and their outcome in identifying neurodegenerative, neurological and reversible causes of cognitive difficulties.