

Cognitive Screening In Life Insurance

Hank George, FALU, CLU, FLMI

It became apparent from recent chief life underwriter surveys and discussions at underwriting study groups that we need to take a closer look at how we screen life insurance applicants for cognitive dysfunction.

The time commitment needed to undertake a thorough independent review of this subject was too great for my company to absorb without financial assistance.

Therefore, I took the same approach in addressing this issue as I did with NT-proBNP and cystatin C.

I approached executives at Univita Health – developers of the Minnesota Cognitive Acuity Screen (MCAS) test – and invited them to provide the financial support necessary to undertake an assessment of this issue.

They agreed, understanding as they did so that I would carefully weigh all of the evidence and make whatever observations I deemed appropriate based solely on that evidence and without regard to their impact on any given screening option.

This white paper is the result of my investigation.

It consists of five sections looking at different aspects of the issue, plus references for all cited data.

I extend my sincere thanks to Univita Health for making this commitment on behalf of the life underwriting community.

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The author declares that his sole compensation for this project was a sum intended to cover his labor costs, that he has no financial interest in Univita Health and that there is no agreement or understanding in place regarding future compensation of any kind related directly or indirectly to Univita Health and/or the Minnesota Cognitive Acuity Screen (MCAS).

SECTION I: Cognitive Dysfunction

What is dementia?

"The loss, usually progressive, of cognitive and intellectual function, without impairment of perception or consciousness, caused by a variety of disorders (structural or degenerative) but most commonly associated with structural brain disease"

Stedman's Medical Dictionary
28th Edition
Lippincott Williams & Wilkins
Baltimore, 2006

What is the prevalence of dementia in the United States?

Studies have shown dementia rates ranging from "...2%-12% for people in their 70s to 30%-50% for those in their late 80s and up."

Al Klein, FSA, MAAA
Milliman, Inc.
"Cognitive Testing for Older Clients on the Rise"
The National Underwriter
January 18, 2010

Is the prevalence of dementia expected to increase?

Yes.

It has been estimated that the number of affected individuals will double every 20 years, largely as a result of greater longevity in the elderly. [Luck]

What is the main type of dementia?

Alzheimer disease (AD), accounting for 70% of cases, with a steeply increasing prevalence over age 70. [Lipsky]

Does dementia have a recognized precursor state?

Yes.

"Clinical and epidemiological evidence have indicated that patients with Alzheimer disease undergo a long-standing preclinical phase in which cognitive deficits remain subtle...before the threshold of dementia is reached."

Peter Schönknecht MD, et al.
University of Heidelberg
American Journal of Psychiatry
152(2005):2071

This preclinical phase is known as mild cognitive impairment (MCI).

What is MCI?

Mild cognitive impairment is a syndrome defined as cognitive decline to a greater extent than expected based on an individual's age and education, without significant compromise of that person's capacity to execute activities of daily living.

It is distinct from dementia, wherein cognitive deficits are more severe and widespread, thereby exerting a substantially adverse effect on daily functioning. [Gauthier]

MCI is associated with neuroanatomical changes like those present in early AD. [Cherbuin, Ries]

How prevalent is MCI?

Studies over the last decade have cited widely differing estimates of MCI prevalence, ranging from 3-5% to 20-28% at age 65 and over. [Joshi, Lopez, Plassman] As in dementia, prevalence increases steeply with age.

The incidence of MCI is believed to be essentially the same as that for dementia. [Ashford]

What is the most instructive way of characterizing the range of cognitive dysfunction?

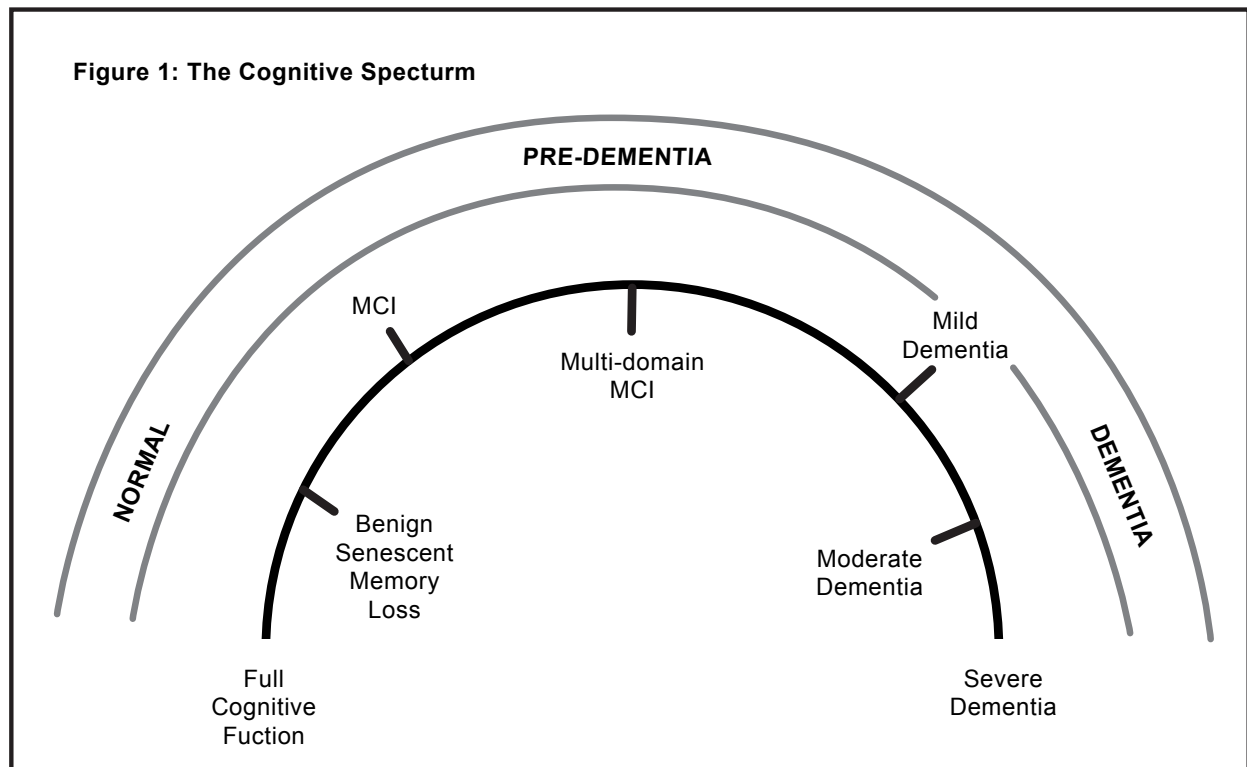
"Cognitive dysfunction is not a threshold, but a continuum, affecting different cognitive domains, at different rates, from different causes."

Vladimir Hachinski, MD
University of Western Ontario
Journal of the American Medical Association
300(2008):2172[editorial]

Are the distinctions between the cognitive states, as depicted in Figure 1, always clear cut?

No.

"Difficulties remain in defining the boundaries between normal ageing and mild cognitive impairment, and between mild cognitive impairment and mild dementia. Many of these distinctions depend on the degree of functional impairment."



Serge Gauthier, MD
 McGill University Medical School
 Montreal, Quebec
The Lancet
 367(2006):1262

Are self-perceived memory issues common at age 65 and older?

Yes.

In a study of 3079 elders, Blazer and coworkers found that 56% had some degree of memory complaint.

There are many pathological mechanisms that can account for memory dysfunction in the absence of MCI/dementia, including delirium, head trauma, strokes, depression and medication side effects, as well as benign senescent forgetfulness associated with normal aging. [Budson]

Is memory loss the main presentation of cognitive dysfunction predicting for eventual AD?

Yes...but not in other forms of dementia of equal concern to insurers. [Aggarwal]

What are the three essential criteria for MCI? [Tabert]

- Memory problems
- Cognitive impairment, manifesting as > 1.5 standard deviations below age-adjusted norms on cognitive tests
- Intact daily functioning

Does MCI often involve cognitive domains other than memory?

Yes.

There are two basic types of MCI: amnesic and non-amnesic. The former, associated with memory impairment, is 50% more common. [Manley]

Amnesic MCI (aMCI) is further separated into single domain (memory only) and multiple domain (memory impairment plus other features) subtypes.

In addition to memory problems, over 2/3rd of MCI patients have deficits in temporal orientation, 30% in semantic fluency and 23% in calculation skills. In a substantial share of cases memory is not the most severely affected aspect of cognitive function. [Ribeiro]

As you will read further on, this is a particularly important matter for life insurance screening because some tests we currently use are focused largely on memory dysfunction and do not address a wider range of cognitive impairment manifestations.

What are the three possible outcomes in MCI?

1. Progression to overt dementia
2. Stabilization in a pre-demented state
3. Return to essentially normal cognitive functioning

What is the likelihood of progression from MCI to dementia?

Clinical and epidemiological investigations report differing rates of progression:

- A major 69-site American/Canadian study reported a 16% annual rate of progression from MCI to Alzheimer dementia. [Petersen]
- Lonie and colleagues found that 41% of their aMCI subjects came to be diagnosed with dementia over 4.3 years.

- Ribeiro and coworkers cited an annual conversion rate of 12%.
- After 36 months' follow up, Fleisher noted an annual progression rate of 16%.

Thus, between 10% and 16% of persons meeting MCI criteria will go on to meet the criteria for clinical dementia each year.

This underscores the urgency of using a screening instrument with the demonstrated capacity to pinpoint MCI cases as well as those afflicted with frank dementia.

Which outcome is more likely – stabilization as MCI or normalization of cognitive capacity – among those who do not go on to clinical dementia within 5 years?

Roughly three out of four (75%) will remain impaired and therefore continue to be at heightened risk for eventual dementia. [Hsiung, Maioli]

What might explain why some individuals said to have MCI are subsequently judged to be cognitively intact?

“The fact that a person may meet criteria for MCI at one point but not at a later one may reflect extrinsic factors – such as alcohol use, drug use, brain injury and metabolic disturbances – that can produce decrements to cognitive abilities similar to those seen in MCI.”

Brent J. Small, PhD, et al.
University of South Florida Medical College
Geriatrics
62(2007):19

It is likely that some portion of these cases will be identified by routine underwriting practices, independent of cognitive screening.

Do individuals with MCI and early-stage dementia usually seek medical help?

No, because decrements of function loss are subtle, and lesser degrees of impairment in elders often go unnoticed by cohabitants. [Begum]

Is cognitive dysfunction frequently undiagnosed?

Yes.

“Dementia is strikingly underdiagnosed. Studies show that more than half of patients who meet standardized criteria for dementia don’t have the diagnosis noted in their medical records.”

Experts say that physicians' frequent failure to make or record the diagnosis stems from insufficient education about recognizing early cognitive impairment, as well as from stigma and the fear and hopelessness that dementia evokes in both the public and physicians."

Susan Okie, MD, et al.
Georgetown University Medical School
The New England Journal of Medicine
365(2011):1069

Studies tell us that anywhere from 30% to 76% of cases, especially those with MCI, are missed by community-based physicians. [Dungen, Holsinger, Joshi, Valcour]

Does clinical recognition of MCI assure that this diagnosis will be recorded in the physician's notes?

No, as demonstrated in a recent study where 44.7% of patients were clinically recognized but barely one in four of them had this condition cited in their medical records. [Mitchell]

The implications of this should be evident to anyone who thinks we can adequately address the risk of MCI simply by seeking out attending physicians' statements!

Is there extra mortality in MCI and dementia?

Yes.

In a study where subjects age 60 and over were cognitively assessed with a brief screening tool during a routine clinic visit and followed for an extended interval of years, these unadjusted mortality rates were reported at the end of the observation period: [Sachs]

Degree of Cognitive Impairment	Mortality Rate	Median Survival
None	57.4%	138 months
Mild	68.1%	106 months
Moderate-to-Severe	78.6%	63 months

There is abundant evidence that MCI is associated with approximately twice the mortality seen in cognitively intact individuals of the same age. [Frisoni, Langa, Storandt, Tuokko]

What are the key take-home messages from Section I?

- Both dementia and MCI are highly prevalent.

- The incidence and prevalence of both are likely to increase substantially among life insurance seekers in the years ahead, especially as we continue to write increasing volumes of new business at ages 75 to 90+.
- MCI is critically important to us because it is highly disposed to progression to overt dementia.
- While memory loss is the most prominent dysfunctional domain in the larger subset of MCI patients, various other aspects of cognitive decline are commonly present.
- To maximize our capacity to identify MCI and early dementia, we need to be able to hone in on applicants with early cognitive impairment across a broader spectrum than memory only.
- Most cases of MCI and many with early overt dementia are either missed by attending physicians or not recorded in their records.
- There is significant excess mortality in both MCI and dementia.

SECTION II: Cognitive Screening Implications for Life Insurance

What is a screening test?

It is a preliminary procedure used to distinguish individuals who may require further evaluation for the presence of a given condition from those who are less likely to harbor that condition.

Screening tests are widely used in clinical medicine as well as life underwriting. Most of the medical tests we use to underwrite are intended primarily to screen applicants.

Is screening meant to yield a diagnosis?

No.

“...it is critical to recognize that a screening test does not produce any diagnosis, any more than a nonspecific blood test result would be considered a diagnosis.”

J. Wesson Ashford
Stanford/VA Aging Clinical Research Center, Palo Alto
Aging and Health
4(2008):399

Screening is intended to identify individuals who require further evaluation to determine if the impairment under consideration is present.

Why is cognitive screening important?

To reinforce what was covered in Section I:

“Currently in the United States, 40 million people are aged 65 and over, and this population will double by 2040, with the largest growth in those aged more than 85 years. At age 65 years, the lifetime risk for Alzheimer disease is 9.1% for men and 17.2% for women, and this risk increases with advancing age.”

Jennifer G. Chester, et al.
Albert Einstein College of Medicine
New York City
The American Journal of Medicine
124(2011):662

Add to this the fact that the incidence of mild cognitive impairment, the precursor to AD/dementia, is equal to that of dementia, and the implications for life insurers become obvious.

Why *must* most life insurers do cognitive screening on a credible basis?

- Most life carriers do a significant – and in many cases, growing – share of their business in the elder market.
- MCI and dementia are highly prevalent in this market.
- Both have significant excess mortality.
- Those who are cognitively impaired are more apt to be frail than cognitively intact applicants. Frailty is a huge marker for excess mortality independent of the risk conferred by cognitive dysfunction. Those having both MCI and frailty are at increased mortality risk from comorbid chronic disease.
- Attending physicians as well as family members often fail to recognize early cognitive impairment.
- Attending physicians' statements are apt to be devoid of documentation of the presence of suspected cognitive impairment. [Chodosh, Ganguli] Therefore, relying solely on APS content in this context is certain to be inadequate for our needs.
- Further to this point, concern has been expressed among physicians about the impact of any dementia screening they do on their patients' access to life insurance. [Fox]
- The potential for antiselection is substantial, as shown by Bob Pokorski, MD, in his April, 2006 presentation at the Long Term Care Insurance Forum. In that lecture, Bob cited "*an almost 4-fold increase*" in life and long term care insurance-seeking by individuals informed that they harbor the high-risk apolipoprotein e-4 allele.
- Concern for antiselection is compounded by that fact that brokers – typically shopping business to multiple carriers based on carriers' demonstrated underwriting proclivities – constitute a major share of our primary distribution system to the older age market.
- Cognitive testing exerts a notable sentinel effect that serves to lessen the number of dementia cases seen by insurers. Carriers that do not screen will inexorably attract a disproportionate share of this business.

Why is it important to use tests that address multiple domains of cognitive function?

1. Memory dysfunction is not always the first feature in MCI.
2. A substantial share of MCI cases will be missed if cognitive screening is limited, largely or entirely, to memory-only functioning.
3. Progression from aMCI to AD is greatest in multiple-domain MCI.

For these reasons, leading clinical experts prefer multi-domain screening. [Carter, Devenand, Fleisher, Ganguli and Snitz, Matthews, Nordlund, Palmer, Ribeiro]

Is there a laboratory marker readily accessible to life insurers conferring value in the context of cognitive decline?

Yes, cystatin C, a novel marker associated clinically with superior detection of renal impairment than that afforded us by creatinine at older ages.

- Lopez and Kuller followed a cohort of 274 subjects for 4 years and observed that cystatin C elevation correlated with progression from normal cognition to dysfunction. It also demarcated MCI culminating in frank dementia, as compared to those that continued to manifest stable MCI.
- Yaffe found that cystatin C correlated well with significantly poorer performance on two cognitive screening tests (including the MSME).
- In an assessment of 2140 subjects, mean age 74, Sarnak showed that the risk of cognitive impairment doubled in the top quartile of cystatin C, as compared to the other three quartiles.

Cystatin C testing may have value as an adjuvant resource, complementary to cognitive testing, while also enhancing our detection of chronic kidney disease (and other significant) risks.

To learn more about cystatin C in an underwriting context, please see my white paper posted at www.insurintell.com.

SECTION III: Revelations From Industry Surveys

We have data from two surveys of life chief underwriters addressing cognitive screening practices and perceptions:

1. The 2010 Older Age Underwriting Survey
2. The 2011 Cognitive Function Test Survey

More than 90 companies participated in each, with roughly 85% completing both surveys.

The following questions were addressed in both surveys:

How many companies employ cognitive testing on some basis?

	2010	2011
Currently Use	39%	44%
Planning to Start	5%	10%

At what ages do current users commence cognitive screening?

	2010	2011
< Age 70	10%	12%
Age 70	39%	43%
Age 71-79	44%	40%
≥ Age 80	7%	5%

Which cognitive tests do companies use on some basis?

	2010	2011
Delayed Word Recall	71%	70%
Clock Drawing/Copying	55%	60%
MMSE	19%	28%

Immediate Word Recall	13%	0%
SPMSQ	10%	8%
MCAS	7%	18%

Note: many carriers use more than one test, and a number of other tests were named by one or two respondents only.

Do companies conduct cognitive testing with teleinterviews?

	2010	2011
Yes	29%	45%
No	71%	55%

All of the following questions were asked in the 2011 survey only:

At what face amount do users start requiring cognitive tests?

	2011
< \$100,000	48%
\$100,000	20%
\$100,001-300,000	8%
> \$300,000	12%
Elective use* only	12%

* These companies do cognitive testing based solely on underwriter discretion, in lieu of age/amount screening.

How do cognitive test users rate the quality of their main or only cognitive test?

	2011
Excellent	5%
Very Good	32%
Adequate	55%
Barely Adequate	8%

Do insurers use cognitive tests performed with exams?

	2011
Yes, MD Exams Only	10%
Yes, Paramedicals Only	20%
Yes, Both	52%
No	18%

How many companies have changed their main or only cognitive test in the past 3 years?

	2011
Yes	10%
No	90%

To what extent do chief underwriters think their companies' use of cognitive tests will change over the next 5 years?

	2011
Increase Substantially	10%
Increase Minimally	40%
No Change	35%
Decrease	5%
Cannot Estimate	10%

How do chief underwriters rate the relative value of cognitive testing as compared to other routine tests used at older ages?

	Greater	Same	Less	Do Not Use	No Opinion
Blood Profile	13%	30%	47%	0%	10%
Urine Test	28%	27%	35%	0%	10%
PSA Test	43%	12%	30%	3%	12%
ECG	25%	30%	35%	0%	10%

Rx Profile	30%	10%	38%	7%	15%
Frailty Tests	13%	48%	12%	15%	12%

The following question was asked in the 2010 survey only:

What are the impressions of chief underwriters regarding key issues related to current cognitive testing?

	2010		
	Yes	No	No Opinion
Are They Consistently Well Done?	35%	55%	10%
Do They Provide Consistently Credible Results?	39%	48%	13%
Do Applicants Often Object To Them?	16%	68%	16%
Do Producers Often Object To Them?	29%	58%	13%

What conclusions can we draw from these survey findings?

1. Cognitive testing is *woefully* underutilized by life insurers.
2. Use will likely increase in the next half decade.
3. The majority of users begin deploying these tests at appropriate ages.
4. The majority begin using these tests at appropriate face amount thresholds.
5. Delayed word recall and clock-type tests are the most widely used, and their level of use has remained stable.
6. MCAS is the fastest growing cognitive test in life underwriting
7. Use of MMSE is also increasing.
8. Use of cognitive tests with teleinterviews increased 50% in just one year.
9. The perceived value of cognitive testing compares favorably with other screening tests.

10. Savvy chief underwriters recognize that cognitive testing is a better use of their requirement budget than PSA screening!
11. The substantial majority of both applicants and producers do not object to cognitive testing.
12. The majority of users are *something less than elated* with the quality of their current test(s).
13. There is noteworthy dissatisfaction with how cognitive tests are currently performed.
14. There is a similar degree of dissatisfaction with the yield from these tests.

SECTION IV: Comparative Analysis of Cognitive Tests Currently Used in Life Underwriting

“Cognitive testing needs a lot of study in our industry.”

– Comment by a chief underwriter at a major life insurer

As part of this project, I solicited input from a fair number of direct and reinsurance chief underwriters, medical directors and underwriters employed by major brokerage agencies.

Some of their comments will be cited throughout the next two sections of this white paper. Their names and company affiliations will not be disclosed, as this would have inhibited, for obvious reasons, virtually all of them from offering up their views!

Short Portable Mental Status Questionnaire (SPMSQ)

What is the SPMSQ?

This test assesses the subject's ability to perform serial subtractions and to recall certain other items. It can be administered in person or over the telephone. [Jacobson]

Is SPMSQ a suitable screening test for dementia?

Yes, and also for progression from MCI to AD. [Ashford, Tang-Wai]

What are its drawbacks from our perspective?

1. It has not been shown to be an effective screen for mild-to-moderate MCI.
2. Its sensitivity for dementia in the general community is only 55% and by inference would be even lower for MCI. [Fillenbaum]

Mini-Mental State Examination (MMSE)

What is the MMSE test?

The full MMSE test screens multiple domains of cognitive function, including orientation, attention,

calculation, recall, language and constructional ability. A score is computed across all domains, with a maximum 30 points

The median score in cognitively intact persons is 28; scores < 24 are consistent with significant cognitive impairment.

MMSE is said to be the most widely used screening test for dementia. [Aprahamian]

What is the purpose of this test?

“The MMSE was developed as a brief means to administer a standard inventory to screen for mental dysfunction in a medical environment...[it] was not designed to test for dementia but the MMSE score later became a popular index for dementia.”

Ashford
Op. Cit.

What are the sensitivity and specificity of MMSE in the general community for patients without a standing clinical diagnosis of dementia?

In the original study, they were 82% and 67% respectively. [Folstein]

More recently, MMSE accuracy has been pegged at between 82% and 87%. [Knudsen; personal communication]

Is the MMSE score associated with mortality risk?

Yes.

In two studies, subjects with scores less than 22 and 23 respectively have been linked to significant excess mortality, as compared to higher scores. [Bassuk, Holwerda]

Is MMSE a suitable test for MCI?

No.

“...the MMSE, which has been proven to be an effective tool in screening individuals already suffering from dementia, has proven comparatively insensitive to MCI.”

Nicholas Cherbuin, PhD, et al.
Australian National University, Canberra
American Journal of Geriatric Psychiatry
18(2010):723

Four of 5 clinical studies affirm that MMSE is ill-suited for MCI screening. [Lancu, Lomholt, Ravaglia, Shankle, Umidì]

What is the main problem in this regard?

Individuals with MCI tend to score in the normal range, especially if they have higher educational attainment, because MMSE had an education bias. [Grundman, Plassman, Young]

This drawback would be consistent with many false-negative MMSE tests in a life insurance context, in part because our applicants have disproportionately higher levels of educational attainment than persons of the same age in the general elder population.

Adjusting for this problem would significantly increase the rate of false-positives. Both outcomes – excess false-positives or many false-negatives – are undesirable from our perspective and the former would be particularly irksome at a time when senior management is focused on increasing sales volumes!

For these reasons, MMSE is not a desirable option for life insurance cognitive screening.

Clock Drawing Test (CDT)

What is the CDT?

As the name implies, the individual being screened is asked to either draw or copy a clock face, putting in all the numbers and showing the clock hands indicating a stated time.

The CDT ranks second behind the MMSE in terms of global use as a clinical dementia screening test. [Arahamian]

What are the two principal advantages of the CDT?

1. It is faster and simpler than the MMSE. [Nishiwaki]
2. It tests more than just memory by virtue of including an executive functioning component. [Chester]

Is CDT an effective test for dementia?

Yes. [Bodner, Chen]

Have any studies been done correlating CDT with mortality?

Yes.

Nishiwaki et al. reported 60% greater mortality in subjects with CDT scores of 2 or less, as compared to those with a score of 3 or 4.

Is CDT an effective screening test for MCI?

No.

This aspect of CDT has been studied by many investigators, and the consensus is that it is ill-suited in this context. [Ehreke, Lee, Nishiwaki, Pinto, Powlishta, Ravaglia, Seigerschmidt, Umidi]

What is the other major drawback inherent in the CDT?

It is significantly more difficult to score than the other tests we currently use. [Price, Shulman]

Reliable scoring requires considerable expertise, and adapting CDT for MCI would require an even more complex scoring system. [Parsey]

One chief underwriter and one reinsurance medical director each commented that both CDT administration and scoring in a paramedical context are *“too inconsistent.”*

Delayed Word Recall Test (DWR)

What is the DWR test?

The standard version asks the subject listen to 10 words twice, use each in a sentence and then recall these words ≥ 5 minutes later, with discussion of another topic during the interim. This version is referred to hereafter as DWR-10.

A 3-word version (hereafter, DWR-3) is used by a few life insurers.

Do most cognitively intact individuals recall all 10 words in the DWR-10?

No. Only 1 in 55 will do so.

The mean score is 6 words, and some normal subjects recall as few as 3 out of the 10 words. [Jacobson]

Why is the DWR-10 an effective test for early AD?

Failure to transfer information from temporary storage to more permanent memory is a benchmark feature of episodic memory dysfunction in preclinical AD. The DWR-10 excels in identifying such failures. [Backman]

Is DWR-10 a credible marker for progression from MCI to AD?

Yes. [Fleisher, Olazarán, Tabert]

Does the DWR-3 confer significant value?

No.

- Its clinical sensitivity and specificity are poor, even for known AD. [Kuslansky]
- In one study, 17% with normal function were classed as having clinical AD while 13% with known AD were said to be cognitively intact. [Chandler]
- In the words of a chief underwriter: *"I don't ever recall seeing anyone miss even one word!"*

DWR-3 is clearly not a cognitive screening test worthy of consideration for use in life underwriting.

What are the notable advantages of DWR-10?

- It is free.
- It is widely used in life and long term care underwriting.
- It tests the registration and memory domains.
- It is simple and quantitative.
- In theory, it could be administered telephonically. However, it has not been validated as a telephone-based screening tool.
- Its sensitivity and specificity for dementia are superior to those reported for the other tests considered thus far. [Knopman and Ryberg]
- It is effective in terms of the risk of MCI progression to dementia.
- It has been shown to correlate well with AD-type anatomical changes in the brain. [Mortimer]
- A number of chief underwriters and medical directors hold this test in high regard (especially so relative to CDT).

- An extended version of an industry mortality study – based on over 14,000 participants, ages 70 and older – has demonstrated that a score of 5 or lower is associated with nearly 200% extra mortality. [Vecchionne]

What are the drawbacks of DWR-10?

- It is unlikely to detect a significant share of MCI cases because it is predominantly centered on memory function. [Fleisher, Libon] A substantial subset of MCI patients are either primarily or solely impacted in a non-memory cognitive domain.
- Numerous factors, for which we cannot control, have been shown to innately limit a subject's capacity to register and recall words. This is a concern because, with DWR-10, we put too many of our "eggs in one basket (memory)", so to speak.[McCarten]
- Correlation between initial test results and those when the test is repeated 3 months later has been found to be "only fair." [Salmon]
- Results have been demonstrated to be influenced by how many hours of sleep the subject gets the evening prior to the test. [Xu]
- Performance has been shown to be significantly affected after just two months of transdermal estrogen replacement therapy. [Hogervorst]

There is another disconcerting factor as well, nicely summarized by one well-informed respondent's succinct statement provided as a result of my overture to industry leaders for comments:

"If I can learn [the words], so can an agent...and client."

One brokerage chief underwriter opined that pre-test instructions given to applicants are often poorly presented, adversely affecting performance and resulting in avoidable false-positives.

One reinsurance chief underwriter noted *"significant inter-rater reliability problems,"* occasioned in part by inadequate training of those who administer the test in an insurance setting.

Minnesota Cognitive Acuity Screen (MCAS)

"The MCAS is a psychometrically sound cognitive screening test that performed well in discriminating healthy elderly persons from those with cognitive impairment."

David S. Knopman, MD, et al.
Mayo Clinic

What is the MCAS test?

It is a 9-domain cognitive screening test, covering the domains of orientation, attention, delayed word recall, comprehension, repetition, naming, computation, judgment and verbal fluency.

It was developed by researchers at the Mayo Clinic and Nation's CareLink, based on a study of patients at 12 nursing homes. [Knopman]

How can MCAS be administered?

MCAS was developed as a telephone screening tool. Thereafter, it was validated by extensive field testing for use in a face-to-face context.

How does MCAS compare to other cognitive screening tests used in long term care underwriting?

An unpublished investigation of *"Impact of Cognitive Testing on Long Term Care Insurance Profitability"* undertaken in 1999 by two prominent consulting actuaries found that MCAS was superior to MMSE, SPMSQ and DWR-10.

Has the mortality impact of MCAS been studied?

Yes.

A comprehensive study by Peggy Hauser, FSA, MAAA, Senior Vice-President/Actuarial Service, Univita Health, was published in *On The Risk*. [26,1(2010):54]

This study was based on 381,049 tests administered to applicants seeking coverage from more than 30 LTC carriers.

Has this study been vetted by outside experts?

Yes, by actuaries at RGA Re. [Muccigrosso, personal communication]

What did this mortality study reveal?

Subjects found to be unimpaired based on MCAS score had a relative mortality ratio of 91.8%, as compared to 157.2% for those deemed to have a positive MCAS test.

Relative mortality in impaired persons decreased modestly over shorter durations, from 183.6% in

year 1 to 160.5% in year 5.

Was MCAS found to be effective in determining the presence vs. absence of mild-to-moderate MCI?

Yes, 98.1% effective, making it the most reliable test for MCI among those reviewed in this white paper.

Is there any further evidence that MCAS is highly efficient in detecting MCI and distinguishing it from both AD and normal cognitive function?

Yes.

Ott and his colleagues at Brown University's Alzheimer's Disease and Memory Disorders Center addressed this question when evaluating 3 groups of subjects: 100 high-functioning persons with MCI, 50 individuals with high-functioning AD and 50 carefully-screened controls free of cognitive dysfunction and related conditions.

They summarized their findings as follows:

"The MCAS successfully discriminates mild cognitive impairment from Alzheimer's disease."

Brian Ott, MD, et al.
American Journal of Alzheimer's Disease and Other Dementias
[paper accepted; publication pending]

In addition, an unpublished 2004 investigation by Medical Care Corporation (Irvine, California) reported that MCAS was substantially superior to both MMSE and CDT in terms of distinguishing MCI. [Siegel, personal communication]

What are the notable advantages of MCAS?

- It is standardized.
- Its mortality implications have been published and vetted by outside experts.
- It was specifically developed for use in insurance screening.
- Over 800,000 MCAS tests have been performed for LTC and life underwriting over the past decade; 560,000 as teleinterviews and the rest during face-to-face interviews.
- It addresses 9 distinct domains of cognitive function, including DWR; thus, it confers a major advantage over tests focused on just one or two domains.

- It is quantitative.
- It was found to have greater overall reliability than DWR-10 by reinsurance experts. [RGA Re Webinar]
- It has a false-negative rate of 1 per 13,000 tests. [RGA Re Webinar]
- At this writing, it is administered solely by registered nurses who are well trained, heavily scripted and quality controlled.
- The cut-point for a positive test can be set by the insurer.
- It has outstanding consistency. [Knopman]
- It is effectively immune to antiselection.

In marketing materials, a prominent LTC carrier advises producers that...

“...MCAS not only improves our risk selection but also allows us to potentially accept more applicants who may be falsely classified using less sophisticated instruments.”

One reinsurance chief underwriter described MCAS as the “*best choice*” when compared to CDT and DWR-10.

The chief underwriter of one of the largest life insurers reported that the MCAS test did not generate significant pushback from producers.

One veteran underwriter from a large brokerage organization commented, “*...clients react better to the MCAS vs. the testing administered by paramed services.*”

What are the drawbacks to MCAS?

- It is not free.
- It takes somewhat longer to administer than the CDT and DWR-10 tests.
- It is ill-suited for paramedical administration; therefore, face-to-face use would require 2 client appointments (a reality unlikely to curry favor with producers).
- While it is readily usable via teleinterview, one must question whether this could be effectively accomplished by teleinterviewers lacking skills, training and experience akin to that of the nurses currently conducting these tests.

SECTION V: Teleinterviews & Cognitive Screening

Why is it important for us to specifically consider cognitive testing in a teleinterview context?

1. Teleinterviews have been shown beyond any reasonable doubt to be the ideal way to take risk histories from insurance applicants.
2. Teleunderwriting is now deployed by the substantial majority of life insurers.
3. The number of life insurers doing teleinterview-based cognitive screening increased 50% in just one year.

What are the drawbacks to paramedically administered cognitive tests that might encourage insurers to further consider the teleinterview alternative?

- Paramedical technicians have relatively less experience administering cognitive tests as compared to their other duties. [Margolis]
- The training and skills of paramedical technicians may make them less suited to this role than to the other tasks they are accountable for.
- One prominent chief reinsurance underwriter observed that paramedically conducted cognitive tests are *“lacking in consistency”* with too many false-positives and false-negatives (both of which have adverse implications for sales as well as underwriting).
- One chief underwriter, when asked how he regarded the quality of paramedical cognitive testing, said that describing it as *“unevenly executed...would be a charitable response.”*

Does this mean that paramedically conducted cognitive screening should be discontinued?

No.

While it would be desirable if *all* risk histories were taken via teleinterview, it is clear that paramedicals will continue to play a role here for the foreseeable future.

Recent reports of successful deployment of laptop-mediated drilldown questioning in conjunction with paramedical history-taking enhance the prospects for some degree of ongoing paramedical role in cognitive screening.

Is the use of telephone cognitive screening increasing in medicine?

Yes.

“A telephone interview has become the primary modality of cognitive data collection in several epidemiological studies and is now frequently used as a screen for clinical trials requiring participants with cognitive impairment.”

Jennifer J. Manly, PhD, et al.
Columbia University School of Medicine
Archives of Neurology
68(2011):607

What are the three cognitive screening options, among those reviewed in this paper, that are theoretically suitable for use in a teleinterview mode?

- MMSE
- SPMSQ
- MCAS

Are there other telephone-administered cognitive screens that might be adaptable for our use?

Yes: the Telephone Interview for Cognitive Status (TICS), which is essentially the MMSE refined for telephone use, and the Memory Impairment Screen (MIS-T)

These tests have not been shown to have adequate sensitivity and specificity to be seen as having any advantage over prevailing options. [Cook, Crooks, Knopman and Roberts, Lipton, Manly]

Is SPMSQ a good choice for teleinterviewing purposes?

No.

It has been described as “somewhat disappointing” when used over the telephone. [Roccaforte]

Moreover, as explained earlier, it has poor sensitivity and specificity for detecting MCI and early dementia.

Is MMSE a suitable option?

No.

While MMSE may be superior to SPMSQ, it does not appear to function nearly as well telephonically as it does in a face-to-face setting. [Kawas, Norton, Roccaforte and Burke]

Once again, it is encumbered by its limitations in screening for MCI and early dementia.

Should we do DWR-10 via teleinterview?

In my opinion, the answer must be “no.”

As noted earlier, DWR-10 is focused almost entirely on one cognitive domain (memory). It would be easy for applicants with mild-to-moderate MCI to jot down the words and feign use of memory while actually parroting back enough of them “pass” the test.

Consider this timely comment from a prominent BGA underwriter:

“We can actually prepare clients for the test like we do for inspection reports.”

Furthermore, many companies using teleinterviews do not take steps to ensure that the producer is not present at the time the interview is done. Until this is a universal practice, tests amenable to antiselection in this setting are disadvantageous.

Is MCAS the test of choice for teleinterview cognitive screening?

Yes...if only by process of elimination!

However, as one chief underwriter commented:

“We would like to use a teleinterview based cognitive function test but we have concerns now with the multiple phone calls needed to complete the application...adding another phone call for an older age client would require us to work out some logistics as well as technology feeds.”

It is unclear how producers would react to a decision on the part of an insurer to mandate two calls to a client.

To dodge this bullet, it would be ideal if the two elements – cognitive screening and the conventional phone interview – could be melded into a single teleinterview model specifically for the elder life market.

One concern in this regard is the fact that, unlike in the United Kingdom, only 3% of American outsourced life teleinterviewers are nurses, whereas 59% are undifferentiated call center personnel. [SCOR Global Re Teleunderwriting Survey]

This raises the significant question of a drop-off in effectiveness if MCAS was administered by the caliber of lay callers currently doing most of the interviews in our market.

Any marginal increase in testing cost incurred by the use of nurses would likely be more than compensated for in terms of the quality of test administration and thus the validity of test results.

Epilog

It is clear that there are many issues to consider when deciding how to best carry off cognitive screening of older age life insurance applicants.

This white paper has reviewed a range of topics related to how the risk posed by cognitive dysfunction – and in particular mild cognitive impairment – might be most efficiently addressed by insurers.

Hopefully, it will be of value to persons accountable for managing this undertaking.

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