An assessment of the so called Point of Reversibility of Dementia Syndrome in making an effective prognosis for continued use of medication

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Abstract

BACKGROUND: An effort to share our many years of clinical experience.
OBJECTIVE: To predict the effectiveness of medication in advanced phases of dementia in the light of pharmaceutical economics and to find the most suitable alternative treatments.
METHODS: Use of 3 commonly available geriatric tests Mini-Mental State Examination (MMSE), Activity of Daily Living (ADL) and Instrumental Activity of Daily Living (IADL). Threshold values of these tests, after mathematical transformation to comparable values, enables calculation of the hypothetical Point of Reversibility Pr found on the range here called MEKO.
RESULTS: Estimated values of S_D can be used to choose the most effective medical treatment.
CONCLUSION: Beyond the upper threshold of S_D, on the basis of the above mentioned method, continued medication is of dubious value.

Abbreviations:
MMSE – Mini–Mental State Examination
ADL – Activity of Daily Living
IADL – Instrumental Activity of Daily Living
MEKO – Range of Points
Pr – Point of Reversibility

INTRODUCTION

For over ten years at Treatment Centre for the Chronically Sick (Léčebna dlouhodobě nemocných) in Česká Kamenice in the Czech Republic, we have been concerned with vascular dementia. Today, we are still confronting with the symptoms of weakness, tiredness or irritability, and frequent sleeplessness, which often appears in the elderly after a great variety of usually quite minor viral infections. In our experiences, it is in just such cases that we detect the initial stages of dementia.

MATERIALS AND METHODS

Many years' work with patients aged between 65–75, whose dementia we have tried to influence positively, has led us to asses the so called Point of Reversibility, which we denote S_D. For our own purposes, we have chosen MMSE, ADL and IADL tests. The threshold for MMSE 25–26 points, for ADL 95–96 points, and for IADL 75–79 points. For practical and mathematical purposes we use the number 100 to make the values comparable and derive the Coefficient = K, which we multiply by the threshold ranges of these tests:

MMSE 100/30 = 3.33 ADL 100/100 = 1 IADL 100/80 = 1.2

ORIGINAL ARTICLE

Table 1: First group (the average age of the patients 72.95 ± 1.02)

Monitored value	Initial assessment	After 12 months	Statistical difference
MMSE test	17.25 ± 1.42	13.53 ± 1.06	$p < 0.01$
ADL test	44.29 ± 13,29	24.74 ± 7.64	$p < 0.01$
IADL test	33.89 ± 8.18	6.93 ± 4.54	$p < 0.01$
Pr	142.40	78.11	$p < 0.01$

Conclusion: All statistical differences both in the tests and in Pr after 12 months were statistically insignificant in the first group.

Table 2: Second group (the average age of the patients 73.30 ± 0.89)

Monitored value	Initial assessment	After 12 months	Statistical difference
MMSE test	28.03 ± 0.87	27.71 ± 1.25	$p = 0.18$
ADL test	98.13 ± 2.34	97.54 ± 3.56	$p = 0.38$
IADL test	79.55 ± 0.82	79.15 ± 1.46	$p = 0.23$
Pr	286.93	284.79	$p > 0.05$

Conclusion: All statistical differences both in the tests and in Pr after 12 months were statistically insignificant in the second group.

MMSE (25–26) × 3.33 = 83.25 – 86.58
ADL (95–96) × 1 = 95.00 – 96.00
IADL (75–79) × 1.2 = 90.00 – 94.80

83.25 + 95.00 + 90,00 = 268.25
86.58 + 96.00 + 94.80 = 277.38

RESULTS

Pr = 268.25 – 277.38 points on the MEKO range

We combine the resulting threshold values, and the range represents the points of reversibility, that is signifies Pr.

VERICIFATION OF PR VALIDITY

We decided to verify the hypothetically determined Pr indicator in a more exact way than by empiric observation only. Our patients suffering from dementia were divided into two groups. There were 63 patients in the first group whose Pr was determined at 142.4 during the initial assessment. The second group contained 67 patients with the Pr of 286.9. Both groups were comparable in terms of age, sex, education, and they both had the same therapy which was verified by the unpaired t-test with no significant difference being proven.

The second comparison was done after twelve months (see Table 1 and 2).

With advanced dementia, the Pr drop was significant (even in the individual subtests). The Pr drop was 1% of the level of significance. In the second group the differences were statistically insignificant, including the individual subtests. The calculation was performed by means of the unpaired t-test as well. The calculated Pr range seems to be applicable in practice. Its significance lies in no costs and in the easiness of the calculation method, especially for predicting the drug treatment efficiency for the farmacoeconomics.

The statistical calculation was performed in EXCEL 2007 using the statistical functions (mean, mean deviation, and unpaired t-test).

DISCUSSION AND RECOMENDATIONS

The results are, of course, unique to each individual, but it is nevertheless possible to make prognosis with some accuracy of the effectiveness of further medication. Beyond the upper threshold for Pr, most treatment is minimally effective and of debatable value. Though all our work was concerned with and applied to vascular dementia, it may be assumed that the methods would also be useful in other forms of the dementia syndrome. In practice, we would recommend them to other institutions similar to ours.

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APPENDIX 1

Name of the patient .....
Date of examining .....

MINI-MENTAL STATE EXAMINATION (MMSE)

Information for the patient:
Now I will ask you some questions and you will have to do some tasks. Please try to answer as well as you can.

1. ORIENTATION

What day is it today?
What is the date?
What day of a week is it today?
Which month is it?
What year is it?
What season is it?
What country are we in?
What region?
What town?
What is the name of this hospital?
What floor are we on?

Each correct answer scores 1 point, the patient has no more than 10 seconds to answer each question.

2. MEMORY

Now I shall name three objects. Try to repeat them after me and remember them. In a while, I will ask you the words again:

SHOVEL
SCARF
VASE

The words should be pronounced slowly and clearly, about one word a second. If the patient is able to repeat them, give 1point for each correctly repeated word. If the patient is not able to remember the words, repeat them several times (maximum 5 times) until the patient remembers them. Otherwise it is not possible to do 'recall'.

3. ATTENTION AND COUNTING

Now please count backwards from one hundred in sevens. When you have subtracted it 5 times, stop.

100-93-86-79-72-65

For each correct answer, give 1 point. If the patient makes a mistake but continues correctly, only count one mistake. If the patient is unable, or does not want, to do this, say: Please spell the word FOOD backwards.

D-O-O-F

For each correct letter, give 1 point.

4. RECALL

Now try to remember the 3 words you had to memorise:

SHOVEL
SCARF
VASE

For each correct answer, give 1 point.

5. NAMING OBJECTS

Show the patient a wrist-watch. What is this?
Show the patient a pencil. What is this?

Give 1 point for each correct answer.

6. REPETITION

Repeat please: 'The first ship sets sail'.
give 1 point for a correct answer.
Only one attempt is allowed.

7. THREE-STEP INSTRUCTION

Put a sheet of paper in front of the patient and give the following instruction: 'Now take the sheet in your right hand, fold it in half and put it on the floor.'

Right hand
Folding the sheet of paper
Putting it on the floor
For each correct action, give 1 point.

8. READING AND FOLLOWING AN INSTRUCTION

Show the patient a card with the written instruction:
'Close your eyes' and say:
Please read what is written here, and then do it.
Give the patient 10 seconds to comply. The instruction can be repeated three times only.
Count 1 point if the patient actually closes his eyes.

9. WRITING

Hand the patient a blank sheet of paper and a pencil and say:

Please write a sentence.

Give one point if the sentence has a subject (even hidden) and a predicate and is meaningful. Spelling mistakes are acceptable.

10. RE-DRAWING A PATTERN

Copy this diagram as closely as possible.
Give one point if the patient draws it within the 1 minute time limit, if all the sides, number of angles, and crossings are correct. Trembling or rotation do not matter.

.

Total Score: . . . . . points

Assessment:	
27–30 points	no cognitive disorder
25–26 points	borderline indications, further visits recommended. In patients over 75, or with less than eight years schooling, these results are still within normal limits.
18–24 points	mild dementia
6–17 points	medium severe dementia
less that 6 points	severe dementia

APPENDIX 2

Activity of Daily Living (ADL)

	Action	Performing the action	Points score
1.	Eating, drinking	Unaided	10
		With help	5
		Not possible	0
2.	Getting dressed	Unaided	10
		With help	5
		Not possible	0
3.	Bathing	Unaided or with help	5
		Not possible	0
4.	Personal hygiene	Unaided or with help	5
		Not possible	0
5.	Continence stool	Fully continent	10
		Sometimes incontinent	5
		Incontinent	0
6.	Urinary	Fully continent	10
		Sometimes incontinent	5
		Incontinent	0
7.	Use of WC	Unaided	10
		With help	5
		Not possible	0
8	Moving from bed to chair	Unaided	15
		With a little help	10
		Can remain seated	5
		Not possible	0
9.	Walking on the level	Over 50 m unaided	15
		50 m with help	10
		50 m in a wheel chair	5
		Not possible	0
10.	Using stairs	Unaided	10
		With help	5
		Not possible	0

Assessment of degree of dependency in basic daily routine	
0–40 points	Highly dependent
45–60 points	Medium dependency
65–95 points	Slight dependency
100 points	Independent

APPENDIX 3

Instrumental Activity of Daily Living (IADL) test

Name of the patient: …… Date: …… Tested by ……

1. **driving a vehicle**
   - totally independently – **10 points**
   - helped or guided by another person – **5 points**
   - unable, or only able to be transported (ambulance, car) – **0 points**
2. **Buying food**
   - totally independently – **10 points**
   - with help of another person – **5 points**
   - unable – **0 points**
3. **Cooking**
   - full meal, independently– **10 points**
   - re–heating a meal, independently – **5 points**
   - unable – **0 points**
4. **Housework (simple tidying such as making a bed, cleaning a floor etc.)**
   - totally independently – **10 points**
   - helped by another person – **5 points**
   - unable – **0 points**
5. **washing clothes**
   - totally independently – **10 points**
   - helped by another person – **5 points**
   - unable – **0 points**
6. **using a telephone**
   - independently finds numbers in a directory, answers the phone and responds adequately – **10 points**
   - needs help when dialling or looking up a number– **5 points**
   - unable – **0 points**
7. **Taking medicine**
   - independently takes the correct drugs at the right time – **10 points**
   - takes the drugs if prepared or reminded – **5 points**
   - unable to take drugs without help – **0 points**
8. **sending money by post or using a card**
   - totally independently – **10 points**
   - with the help of another person – **5 points**
   - unable – **0 points**

Result: . . . . . .

Assessment :

0-40 points:	not self–sufficient in instrumental daily activities
45-75 points:	partial self–sufficiency in daily activities
80 points:	self–sufficient in instrumental daily activities