RESEARCH PAPER

Neurologia i Neurochirurgia Polska
Polish Journal of Neurology and Neurosurgery
2023, Volume 57, no. 5, pages: 438–443
DOI: 10.5603/pjnns.97758

ISSN: 0028-3843, e-ISSN: 1897-4260

To know or not to know? Opinions of patients with Parkinson's Disease on disclosing risk of phenoconversion in RBD

Aneta Marcinkowska[1], Andrzej Bogucki[1], Aleksandra Kroemeke[2], Agata Gajos[1]

[1]Department of Extrapyramidal Disorders, Medical University of Lodz, Central University Hospital, Lodz, Poland
[2]Department of Psychology, SWPS University, Warsaw, Poland

ABSTRACT

Introduction. The aim of our study was to find out the opinion of patients with Parkinson's Disease (PD) whose disease was preceded by REM sleep behaviour disorder (RBD) regarding early information about the high risk of phenoconversion in RBD.

Clinical rationale for the study. RBD is an early clinical manifestation of α-synucleinopathies with a more than 90% risk of phenoconversion to PD, dementia with Lewy bodies (DLB) or multiple system atrophy (MSA). It remains a subject for debate as to whether and how RBD patients should be informed about the high risk of phenoconversion.

The patient's right to full knowledge regarding his or her health conflicts with the potentially destructive impact of this information on his or her mental state and quality of life of them and their relatives.

Material and methods. Thirty-nine patients with PD whose disease was preceded by RBD were surveyed. Data on the course of RBD and PD was collected. Questions were asked about early information about the high risk of phenoconversion to patients with RBD and factors determining the opinion of the surveyed persons.

Results. The majority (> 60%) of respondents gave a positive answer when asked whether patients should be informed about their high risk of developing PD once diagnosed with RBD. Only a few (7.7%) respondents believed that disclosing such information to the patient should be possible only after obtaining his or her consent. Respondents associated consent to information about the high risk of developing PD in people with RBD with high expectations of the healthcare system. We were unable to determine whether factors such as the gender of the subject, the clinical course of the PD, and the RBD duration had an impact on patients' opinions regarding disclosing knowledge about phenoconversion.

Conclusions and clinical implications. Our study provides important information that should influence physicians' communication with patients with RBD, especially regarding how they communicate about the high risk of phenoconversion.

Keywords: REM sleep behaviour disorder, phenoconversion, risk disclosure, patients' expectations, physician-patient relationship

(*Neurol Neurochir Pol 2023; 57 (5): 438–443*)

Introduction

Rapid eye movement (REM) sleep behaviour disorder (RBD) is a parasomnia that affects less than 2% of the adult population, as shown by studies using polysomnography [1–3]. RBD is characterised by violent motor and vocal activity closely related to the content of the patient's nightmares (dream-enactment behaviour) [4–6]. Motor activity is the result of loss of atonia during REM sleep [7].

RBD is an early clinical manifestation of α-synucleinopathies. Within 15 years from the onset of RBD, more than 90% of patients will experience phenoconversion, i.e. they will develop symptoms of Parkinson's Disease (PD) — most often, dementia with Lewy bodies (DLB) or multiple system atrophy (MSA) [8–10].

Address for correspondence: Agata Gajos, Department of Extrapyramidal Disorders, Medical University of Lodz, Central University Hospital, 251 Pomorska St., 92–213 Lodz, Poland; e-mail: agata.gajos@umed.lodz.pl
Received: 08.09.2023 Accepted: 21.10.2023 Early publication date: 27.10.2023

There is ongoing discussion as to whether and how patients with RBD should be informed about the high risk of phenoconversion. The patient's right to full knowledge about his or her health conflicts with the potentially destructive impact of this information on the mental state and quality of life of the patient and his or her relatives [11–14].

Doubts arise from the fact that it is impossible to predict what the effect of phenoconversion (PD, MSA or DLB) will be, and how long it will take until the first motor and/or cognitive symptoms appear. Furthermore, there is no treatment available to modify the natural course of the neurodegenerative process.

Previous research on disclosing information about a high risk of phenoconversion to RBD subjects has focused on the views and expectations of the patients themselves, as well as preferences and practices of physicians. The aim of our study was to find out the opinions of patients with PD, in whom the disease was preceded by RBD.

Material and methods

Patients were recruited from the outpatient clinic of the Central University Hospital, Medical University of Lodz, Poland. The study was conducted according to the guidelines of the Declaration of Helsinki. The study protocol was submitted to the Ethics Committee of the Medical University of Lodz, which issued an opinion that the study was not a medical experiment and did not require approval. Written informed consent was obtained from all participants.

In all patients, PD was diagnosed according to the MDS clinical diagnostic criteria [15].

Inclusion criteria for the study were: a diagnosis of PD within the previous seven years, and a 'yes' answer to a screening question during a routine visit to a neurology clinic [RBD Single-Question Screen (RBD1Q): '*Have you ever been told, or suspected yourself, that you seem to 'act out your dreams' while asleep (for example, punching, flailing your arms in the air, making running movements, etc.)*?' [16]. Those who met these criteria, and agreed to participate, were surveyed at a specially arranged visit to the clinic or in their own home.

Firstly, to confirm the diagnosis of RBD, each patient completed an REM Sleep Behaviour Disorder Screening Questionnaire (RBDSQ) [17], Polish version); a result ≥ 5 points confirms a diagnosis of RBD.

Next, the investigator conducted an interview with the patient, obtaining all the data necessary to complete a questionnaire about demographic data and the course and diagnostic process of both RBD and PD. The next questions concerned the respondents' views on disclosing information about a high risk of phenoconversion to patients with RBD, both in principle and in their own case, and any related expectations towards the healthcare system.

Results

Two neurologists asked the RBD1Q question to a total of 132 PD patients during a routine visit. Eighty patients gave a positive response and tentatively agreed to participate in the study. Later, during an interview with the investigator, 41 patients denied having a sleep disorder, refused to participate in the study, and/or or had a negative RBDSQ score (< 5 points).

Eventually, 39 patients (23 women and 16 men) were included in the study. The mean age was 68.9 ± 7.9 (range 45–85) years. The education of the patients was as follows: higher — 17 persons (43.6%), secondary — 20 (51.3%), primary — 2 (5.1%). The study group was dominated by retirees (33 persons, 85%); two patients (5%) were unemployed, retirees (n = 2; 5%), and two patients (5%) were professionally active.

Loud vocalisations were indicated as the most bothersome symptom by most patients (51%) and most household members (59%). Violent motor activity was mentioned in this context by 38% of patients and 33% of household members. After waking up, 31 (80%) of the subjects always or occasionally remembered the content of their dreams. Three persons (8%) confirmed that dream enactment caused minor injuries, and eight (21%) respondents reported falling out of bed during RBD incidents. In four cases, the partner was forced to sleep separately due to the patient's RBD symptoms. Nine patients (23%) sought medical help because of the bothersome symptoms of RBD. Clonazepam was administered in one case, and melatonin in four cases.

In all studied patients, the result of the RBDSQ confirmed the diagnosis of RBD: the mean score was 9.10 ± 1.96 (5–13) points. The time from the onset of sleep disorders, the picture of which could be consistent with RBD, to participation in the study, ranged from 48 to 684 (mean 215.1 ± 125.5) months. Only four respondents reported that this was shorter than 100 months, but in the majority of participants (51.3%) it did not exceed 200 months. The diagnosis of PD was made 1–564 (mean 171.7 ± 119.3) months after the onset of RBD symptoms. The time from the diagnosis of PD to participation in the study ranged from 1–75 (mean 42.6 ± 21.4) months. In 22 (56.4%) patients, tremor (isolated or in combination) was the first symptom, and we called this group the PD (tremor+) subgroup. In the remaining 17 (43.6%) participants, tremor was neither the first nor an early manifestation of the disease, and we called this group the PD (tremor–) subgroup.

To test an association between gender (men *vs.* women), early clinical manifestation of PD (tremor *vs.* no-tremor) and RBD duration (≤ 10 years *vs.* > 10 years), these variables were cross-tabulated with patients' beliefs about PD risk disclosure in RBD patients. Since more than 20% of the cells had an expected number of less than 5, we abandoned the calculation of the chi-square independence test and analysed the data only qualitatively.

The question: '*Do you think patients should be informed about their high risk of developing Parkinson's Disease once*

Table 1. Results of cross tabulation of patient characteristics (gender, first PD manifestation, and duration of RBD) and beliefs about disclosure regarding high risk of Parkinson's Disease in RBD patients

Question	Do you think patients should be informed about their high risk of developing Parkinson's Disease once diagnosed with REM sleep behaviour disorder?			Would you like to be informed about the high risk of developing Parkinson's Disease at the time of the diagnosis of REM sleep behaviour disorder?	
Participants	Answers			Answers	
	Yes, in any case n (%)	No, never n (%)	Only with patient's consent n (%)	Yes, in any case n (%)	No, never n (%)
All	25 (64.1)	11 (28.2)	3 (7.7)	27 (69.2)	12 (30.8)
Men (n = 16)	12 (75.0)	3 (18.8)	1 (6.3)	13 (81.3)	3 (18.8)
Women (n = 23)	13 (56.5)	8 (34.8)	2 (8.7)	15 (65.2)	8 (34,8)
PD (tremor+) (n = 22)	15 (68.2)	6 (27.3)	1 (4.5) 2 (11.8)	16 (72.7)	6 (27.3)
PD (tremor–) (n = 17)	10 (58.8)	5 (29.4)		11 (64.7)	6 (35.3)
Duration of RBD before onset of PD					
≤ 10 years (n = 19)	12 (63.2)	6 (31.6)	1 (5.3)	12 (63.2)	7 (36.8)
> 10 years (n = 20)	13 (65.0)	5 (25.0)	2 (10.0)	15 (75.0)	5 (25.0)

diagnosed with REM sleep behaviour disorder?' was answered 'yes' by 25 (64.1%) respondents, regardless of gender, first manifestation of PD, or duration of RBD before phenoconversion. Only occasionally did respondents believe that disclosing such information to the patient should be possible only after obtaining his/her consent (Tab. 1).

Also, in response to the more personal question: '*Would you like to be informed about the high risk of developing Parkinson's Disease when you are diagnosed with REM sleep behaviour disorder*?', most respondents (27; 69.2%) answered 'yes' (Tab. 1).

Study participants were presented with seven factors that might have an impact on their own positive attitude towards being informed about the high risk of PD. Respondents were asked to indicate any number of factors that influenced their positive opinion. These were the following (in parentheses we show the percentage of patients indicating a given factor as being significant in making a positive decision):

a. To help advance knowledge about RBD (70.4%);
b. To help other patients in the future (44.4%);
c. The possibility to plan future life (81.5%);
d. Time to build relationships with family and friends (74.1%);
e. Ability to change life priorities (59.3%);
f. Getting help and support (77.8%);
g. To prepare for the coming illness (70.4%).

Thus, all factors except one were confirmed by more than 59% of the respondents. The exception was *Helping other patients in the future,* indicated by only 44.4% (Fig. 1).

The patients were also presented with seven factors that would make them unwilling to be informed about the high risk of PD (in parentheses we show the percentage of patients indicating a given factor as significant in making a negative opinion). Only 3/7 were indicated by more than half of the respondents (Fig. 2).

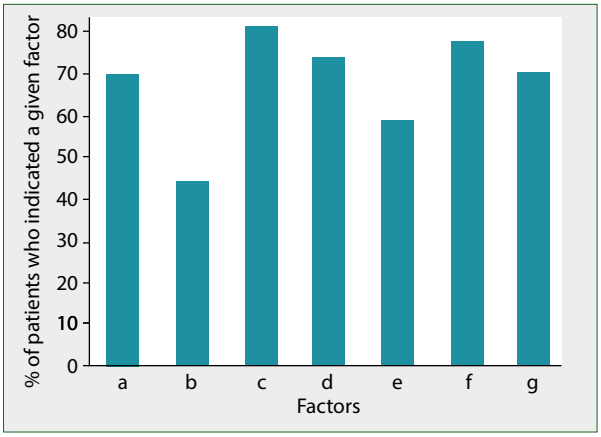

Figure 1. Factors relevant for respondents when making positive opinion on informing RBD patients early about risk of phenoconversion. a) To help advance knowledge of RBD; b) To help other patients in future; c) Possibility to plan further life; d) Time to build relationships with friends and family; e) Ability to change life priorities; f) Getting help and support; g) To prepare for coming illness

a. Fear of lowering mood and quality of life (75.0%);
b. Impact of information on life plans (33.3%);
c. Impact of information on life priorities (16.7%);
d. Feeling of powerlessness (66.7%);
e. Impact of information on relationships with relatives (16.7%);
f. Uncertainty of diagnosis (83.3%);
g. Seeking help and support (33.3%).

Consent to being informed about the high risk of developing PD in people with RBD was associated with high

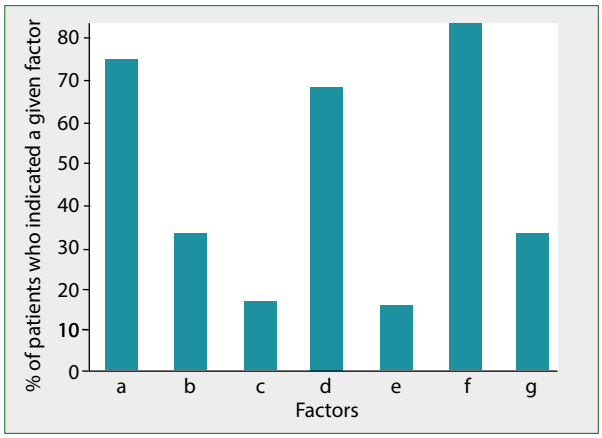

Figure 2. Factors relevant for respondents when making a negative opinion on informing RBD patients early about risk of phenoconversion. a) Fear of lowering mood and quality of life; b) Impact of information on life plans; c) Impact of information on life priorities; d) Feeling of powerlessness; e) Impact of information on relationships with relatives; f) Uncertainty of diagnosis; g) Seeking help and support

expectations of the healthcare system. All the proposals presented to them in this regard were accepted by ≥ 60% of the respondents:

a. Regular follow-up visits (100.0%);
b. Constant contact with the same doctor (100.0%);
c. Family doctor included in the treatment team (76.9%);
d. Access to new treatment options or participation in clinical trials of new therapies (92.3%);
e. Recommendations on lifestyle (physical activity, nutrition) that may affect the risk of developing PD (87.2%);
f. Information about PD (64.1%);
g. Opportunity to receive additional support (e.g. psychological, participation in self-help groups) (69.2%).

Discussion

RBD is an early manifestation of synucleinopathy with an over 90% probability of phenoconversion to PD, LBD, or MSA [8–10]. All three of these neurodegenerative diseases inevitably lead to motor and/or cognitive impairment and force affected patients to change their life plans. There is ongoing discussion as to whether and how patients with RBD should be informed about the high risk of phenoconversion. The patient's right to full knowledge about his or her health conflicts with the potentially destructive impact of this information on the mental state and quality of life of the patient and their relatives [11–14].

Doubts about informing patients are raised by the fact that it is impossible to predict what the outcome of phenoconversion (PD, MSA or DLB) will be, and how much time will elapse before the appearance of the first motor and/or cognitive symptoms. Furthermore, there is no treatment available to modify the natural course of the neurodegenerative process.

Respecting the patient's autonomy should consist, on the one hand, in providing them with access to full information about their health, and on the other hand in respecting their decision to ignore the existence of this information. Patients and their doctors should be partners in this process.

Previous research on disclosing information about a high risk of phenoconversion has focused on the views and expectations of RBD patients themselves. In one study [18], as many as 92.5% of RBD patients expressed the opinion that knowledge about possible future neurodegenerative disease was important to them. According to 75.3% of them, a lack of information about the risk of phenoconversion — after the diagnosis of RBD was made — would result in a loss of trust in the physician. More than half (56.7%) of the respondents believed that the physician should ask the patients about their preferences in this regard [18].

On the other hand, and perhaps surprisingly, 54% of patients with Parkinson's Disease expressed the opinion that they would not like to be informed about suspected PD early in the diagnostic process, before a final diagnosis is made (e.g. when only the diagnostic criteria for prodromal PD were met) [19]. Moreover, the vast majority (87%) of respondents accepting early information believed that disclosing such information to the patient should be preceded by obtaining his or her consent. Thirty seven percent of patients were willing to accept early disclosure of risk only if it opened access to new therapies for the patient [19].

The aim of our study was to obtain opinions on disclosing the risk associated with RBD among PD patients for whom this form of sleep disturbance was the first clinical manifestation of the neurodegenerative process. It might be expected that the opinion of PD patients on disclosing a high risk of phenoconversion would be different than that of those with RBD. Patients with PD can retrospectively assess at what point in their lives they received information about the risk of developing a neurodegenerative disease, and what impact it had on their decisions at that time. They also know when the first symptoms of PD appeared and how these symptoms determined their future lives. Moreover, they have been through an entire diagnostic process.

To both questions regarding early disclosure of the risk of PD to people with RBD, the majority (64.1% and 69.2%) of our respondents gave positive answers. Study participants were able to indicate many more arguments supporting this position than arguments justifying not providing patients with information. In this respect, our respondents' views were much closer to those of persons with RBD [18] than to those of patients with PD [19].

It is likely that patients' different perspectives and experiences influence their views on early disclosure of RBD-related conversion risk and communication of suspected PD before a final diagnosis is made. In our study group, the time from the diagnosis of PD ranged from 1 to 75 (42.6 ± 21.4) months, while in the material [19] with which we compared

our patients, it ranged from 1 to 24 (median 6) years. The longer duration of disease meant that a greater number of patients represented an advanced stage of the disease. They had experienced the limited effectiveness of oral therapies, motor fluctuations and dyskinesias, and they had experienced a significantly higher incidence of non-motor symptoms. For many of them, progressive disability and social isolation were challenges.

Both the patients in our study group, and those in the groups presented by other authors [18, 19], expressed the belief that consent to early disclosure of a high risk of phenoconversion should be associated with special support from the healthcare system.

Significant discrepancies concern patients' opinions about the physician obtaining the patient's consent before providing complete information about the risk of neurodegenerative disease. In our material, only 7.7% of respondents made disclosing the risk of PD dependent on the patient's consent. Just over half (56.7%) of Mayo Clinic RBD patients did not see a need for their physician to obtain consent from them to provide information about phenoconversion [18].

On the other hand, the vast majority (87%) of German PD patients — who accepted information about the disease before the final diagnosis — indicated obtaining the patient's consent as a condition that should be met [19]. It is likely that these significant differences reflect, at least to some extent, differences in physician-patient relationships across different healthcare systems.

Several limitations of our study must be acknowledged. Although a much larger number of patients were prescreened, the size of the study group was ultimately limited. We were unable to determine whether factors such as the gender of the subject, the clinical picture of PD, and the RBD duration had an impact on patients' opinions regarding disclosing knowledge about phenoconversion. Our study was retrospective and concerned the distant past. The extreme values of some data (e.g. duration of RBD until phenoconversion) may raise doubts. However, these were not important in evaluating respondents' opinions on disclosing the risk of phenoconversion.

Despite the above-mentioned limitations, our study, the first to assess the opinions of PD patients on informing persons with RBD about the risk of phenoconversion, provides important information that should influence physicians' communication with patients.

In practice, the approach of physicians in this respect varies significantly. While most physicians involved in the diagnosis and treatment of patients with RBD provide patients with information about phenoconversion, only a few routinely ask patients about their preferences for receiving this information [20], and an even smaller group attempts to provide the patient with a quantitative estimate of risk.

The means by which, and the extent to which, knowledge about conversion should be disclosed to patients remains a subject of debate [12, 14, 21]. The solutions that will be adopted should take into account the preferences of patients themselves.

Article information

Data availability statement: *Original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.*

Ethics statement: *The study protocol was submitted to the Ethics Committee of the Medical University of Lodz, which issued an opinion that the study was not a medical experiment and did not require approval.*

Authors' contributions: *A.M.: Conception, organisation and execution of study, writing first draft of manuscript.*

A.B.: Conception and execution of study, review and critique of manuscript.

A.K.: Conception of study, review and critique of manuscript.

A.G.: Conception and execution of study, review and critique of manuscript.

Funding: *A.M. received research funding from the Project 'Interdisciplinary doctoral studies in the field of the biopsychosocial model of human functioning in the environment' co-financed by the European Union under the European Social Fund.*

Conflicts of interest: *A.B. has served on advisory boards for, consulted for, and/or been a speaker for, Allergan/AbbVie, Krka, Sandoz and GE outside the submitted work.*

A.G. has served on advisory boards for, consulted for, and/or been a speaker for, Allergan/AbbVie, Krka and GE, outside the submitted work.

A.K. and A.M. report no conflicts of interest.

References

1. Chiu H, Wing YK, Lam L, et al. Sleep-related injury in the elderly — an epidemiological study in Hong Kong. Sleep. 2000; 23(4): 1–5, doi: 10.1093/sleep/23.4.1e.
2. Kang SH, Yoon IY, Lee SD, et al. REM sleep behavior disorder in the Korean elderly population: prevalence and clinical characteristics. Sleep. 2013; 36(8): 1147–1152, doi: 10.5665/sleep.2874, indexed in Pubmed: 23904674.
3. Pujol M, Pujol J, Alonso T, et al. Idiopathic REM sleep behavior disorder in the elderly Spanish community: a primary care center study with a two-stage design using video-polysomnography. Sleep Med. 2017; 40: 116–121, doi: 10.1016/j.sleep.2017.07.021, indexed in Pubmed: 29042180.
4. Fernández-Arcos A, Iranzo A, Serradell M, et al. The clinical phenotype of idiopathic rapid eye movement sleep behavior disorder at presentation: a study in 203 consecutive patients. Sleep. 2016; 39(1): 121–132, doi: 10.5665/sleep.5332, indexed in Pubmed: 26940460.
5. Baltzan M, Yao C, Rizzo D, et al. Dream enactment behavior: review for the clinician. J Clin Sleep Med. 2020; 16(11): 1949–1969, doi: 10.5664/jcsm.8734, indexed in Pubmed: 32741444.
6. Iranzo A, Santamaria J, Tolosa E. Idiopathic rapid eye movement sleep behaviour disorder: diagnosis, management, and the need for neuroprotec-

tive interventions. Lancet Neurol. 2016; 15(4): 405–419, doi: 10.1016/S1474-4422(16)00057-0, indexed in Pubmed: 26971662.
7. Montplaisir J, Gagnon JF, Fantini ML, et al. Polysomnographic diagnosis of idiopathic REM sleep behavior disorder. Mov Disord. 2010; 25(13): 2044–2051, doi: 10.1002/mds.23257, indexed in Pubmed: 20818653.
8. Iranzo A, Tolosa E, Gelpi E, et al. Neurodegenerative disease status and post-mortem pathology in idiopathic rapid-eye-movement sleep behaviour disorder: an observational cohort study. Lancet Neurol. 2013; 12(5): 443–453, doi: 10.1016/S1474-4422(13)70056-5, indexed in Pubmed: 23562390.
9. Iranzo A, Fernández-Arcos A, Tolosa E, et al. Neurodegenerative disorder risk in idiopathic REM sleep behavior disorder: study in 174 patients. PLoS One. 2014; 9(2): e89741, doi: 10.1371/journal.pone.0089741, indexed in Pubmed: 24587002.
10. Galbiati A, Verga L, Giora E, et al. The risk of neurodegeneration in REM sleep behavior disorder: A systematic review and meta-analysis of longitudinal studies. Sleep Med Rev. 2019; 43: 37–46, doi: 10.1016/j.smrv.2018.09.008, indexed in Pubmed: 30503716.
11. Vertrees S, Greenough GP. Ethical considerations in REM sleep behavior disorder. Continuum (Minneap Minn). 2013; 19(1 Sleep Disorders): 199–203, doi: 10.1212/01.CON.0000427223.22963.d4, indexed in Pubmed: 23385702.
12. Arnaldi D, Antelmi E, St Louis EK, et al. Idiopathic REM sleep behavior disorder and neurodegenerative risk: To tell or not to tell to the patient? How to minimize the risk? Sleep Med Rev. 2017; 36: 82–95, doi: 10.1016/j.smrv.2016.11.002, indexed in Pubmed: 28082168.
13. Louis ESt. Prognostic counseling for patients with idiopathic/isolated REM sleep behavior disorder: should we tell them what's coming? Yes. Movement Disorders Clinical Practice. 2019; 6(8): 667–668, doi: 10.1002/mdc3.12814.
14. Malkani RG, Wenger NS. REM sleep behavior disorder as a pathway to dementia: if, when, how, what, and why should physicians disclose the diagnosis and risk for dementia. Curr Sleep Med Rep. 2021; 7(3): 57–64, doi: 10.1007/s40675-021-00206-1, indexed in Pubmed: 34336551.
15. Postuma RB, Berg D, Stern M, et al. MDS clinical diagnostic criteria for Parkinson's disease. Mov Disord. 2015; 30(12): 1591–1601, doi: 10.1002/mds.26424, indexed in Pubmed: 26474316.
16. Postuma RB, Arnulf I, Hogl B, et al. A single-question screen for rapid eye movement sleep behavior disorder: a multicenter validation study. Mov Disord. 2012; 27(7): 913–916, doi: 10.1002/mds.25037, indexed in Pubmed: 22729987.
17. Stiasny-Kolster K, Mayer G, Schäfer S, et al. The REM sleep behavior disorder screening questionnaire — a new diagnostic instrument. Mov Disord. 2007; 22(16): 2386–2393, doi: 10.1002/mds.21740, indexed in Pubmed: 17894337.
18. Gossard TR, Teigen LN, Yoo S, et al. Patient values and preferences regarding prognostic counseling in isolated REM sleep behavior disorder. Sleep. 2023; 46(1), doi: 10.1093/sleep/zsac244, indexed in Pubmed: 36259668.
19. Schaeffer E, Rogge A, Nieding K, et al. Patients' views on the ethical challenges of early Parkinson disease detection. Neurology. 2020; 94(19): e2037–e2044, doi: 10.1212/WNL.0000000000009400, indexed in Pubmed: 32291296.
20. Teigen LN, Sharp RR, Hirsch JR, et al. Specialist approaches to prognostic counseling in isolated REM sleep behavior disorder. Sleep Med. 2021; 79: 107–112, doi: 10.1016/j.sleep.2020.12.014, indexed in Pubmed: 33486257.
21. Schaeffer E, Toedt I, Köhler S, et al. Risk disclosure in prodromal Parkinson's disease. Mov Disord. 2021; 36(12): 2833–2839, doi: 10.1002/mds.28723, indexed in Pubmed: 34351002.