Patient Preference and Adherence

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ORIGINAL RESEARCH

Depression, Anxiety, Psychological Symptoms and Health-Related Quality of Life in People Living with HIV

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Objective: To investigate the levels of depression, anxiety, psychological symptoms and health-related quality of life (HRQOL) in people infected with human immunodeficiency virus (HIV) and to assess the risk factors.

Methods: A total of 121 people living with HIV (PLWHIV) were included, and 61 health individuals were selected as healthy controls. Their sociodemographic information was collected. The Self-Rating Depression Scale, Self-Rating Anxiety Scale, Symptom Checklist 90 and Short-Form Health Survey-36 were used.

Results: The depression score was higher in PLWHIV (47.83 ± 10.58 vs 36.52 ± 9.69 P<0.001). Similar results were observed in anxiety score (41.06 ± 11.24 vs 32.31 ± 7.99, P<0.001). Multivariable analysis revealed that younger age (OR=0.929, P=0.004) and smoking (OR=4.297, P=0.001) were identified as independent factors of depression while young age (OR=0.890, P=0.008) and alcohol consumption (OR=4.801, P=0.002) were independent factors of anxiety. Results of SCL-90 questionnaire showed that hostility, paranoia ideation were significantly more pronounced when PLWHIV had depression. Results of HRQOL showed that physical functioning (82.88 ± 14.73 vs 93.41 ± 9.22, P<0.001) and mental health (57.46 ± 17.64 vs 65.68 ± 17.44, P=0.012) were lower in PLWHIV with depression. For PLWHIV with anxiety, vitality (56.96 ± 14.61 vs 67.58 ± 17.57, P=0.004), social functioning (64.52 ± 23.97 vs 74.64 ± 21.47, P=0.036) and mental health (52.57 ± 14.21 vs 65.03 ± 17.98, P=0.001) were lower. High depression level was showed the independent risk factor associated with poor HRQOL (OR=0.370, P=0.001).

Conclusion: Depression and anxiety were very common in PLWHIV. Physicians should not only focus on the antiviral treatment of these patients but also monitor their mental status, especially that of younger patients. For PLWHIV with depression and anxiety, psychological intervention should be provided, and social role rebuilding may be good for depression and anxiety alleviation.

Keywords: acquired immunodeficiency syndrome, human immunodeficiency virus, anxiety, mental disorder, depression

Introduction

Acquired immunodeficiency syndrome (AIDS) is a serious infectious disease. AIDS is caused by human immunodeficiency virus (HIV) infection. Since the first case reported in 1981, HIV has spread widely around the world. According to the World Health Organization, 35.3 million individuals were infected with HIV in 2012, with 2.3 million new cases and 1.3 million patients dying of AIDS each year.[1,2]

Although the introduction of early diagnosis and highly active antiretroviral therapy in clinical practice has allowed control of AIDS and dramatic reduction in

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mortality,[3] AIDS is still considered to be one of top global causes of disability and disease burden in patients, followed by major depression in 2030 as estimated by epidemiologists.[4]

Depression and anxiety are closely related to many viral-related diseases and may affects the prognosis of patients.[5,6] Depression is also closely related to people living with HIV (PLWHIV).[7,8] The relationship between depression and anxiety and HIV is very complicated. Previous studies have suggested that exercise training can significant improvement in all subscales including anxiety disorder, social function, depression and mental health's total score in PLWHIV.[9,10] In addition, another study has suggested that the role of disclosure and discrimination is determinant in HRQOL. HIV should increasingly be regarded as a chronic disease characterized by different pathological conditions requiring a comprehensive and multidisciplinary approach.[11]

Although the morbidity in depression is high in late-stage AIDS,[12] depression can also occur in various stages of HIV infection.[13] This indicates the need for clinical monitoring for the occurrence of depression in patients infected with HIV. Early detection of high-risk patients is a practical clinical strategy by exploring the related risk factors. However, in the Asia-Pacific region, where the prevalence of HIV is rapidly increasing, there are only few contradictory studies of the incidence and risk factors of depression and anxiety in PLWHIV.

Therefore, our study aimed to investigate the levels of depression and anxiety in PLWHIV and to assess the risk factors for depression and anxiety. We also explored the relationship of psychological symptoms and health-related quality of life (HRQOL) with depression and anxiety in PLWHIV. We speculate that PLWHIV with depression and anxiety has different HRQOL and psychological symptoms. Our study can effectively assess the risk of depression, anxiety and poor HRQOL for PLWHIV.

Subjects and Methods

Subjects

This is a cross-sectional study. PLWHIV were recruited continuously from First Affiliated Hospital of Xiamen University and Nanfang Hospital, Southern Medical University. We have also enrolled 61 subjects who received health examinations as healthy controls. We enrolled a total of 121 PLWHIV, and 61 healthy controls. In the PLWHIV group, the average age was 31.4±10.64 with a total of 79 male (65.3%). In the healthy control group, the average age was 33.66±10.95 with 41 male (67.2%). Social demographic data of all patients enrolled were recorded, including gender, age, education, income level, smoking and alcohol consumption. Characteristics of patients enrolled are shown in Table 1. We obtain evidence of smoking and alcohol consumption based on patients' self-reports.

Inclusion and Exclusion Criteria

Inclusion criteria was as followed: All patients enrolled were confirmed to have positive HIV-1 antibody findings. Exclusion criteria were as followed: 1) Patients are excluded if their age is less than 18 years old. 2) Patients combined with central nervous system diseases. The institutional review board of the First Affiliated Hospital of Xiamen University approved the study. All patients provided informed consent. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for inclusion in the study.

Table 1 Characteristics of PLWHIV Group and Health Control

	PLWHIV Group	Health Control	P value
Sample Size	121	61	
Age, years	31.4±10.64	33.66±10.95	0.190
Gender			0.796
Male	79 (65.3)	41 (67.2)	
Female	42 (34.7)	20 (32.8)	
Smoking			0.770
Yes	41 (33.9)	22 (36.1)	
No	80 (66.1)	39 (63.9)	
Alcohol consumption			0.495
Yes	52 (43.0)	23 (37.7)	
No	69 (57.0)	38 (62.3)	
Level of education			0.116
Primary	33 (27.3)	15 (24.6)	
Secondary	30 (24.8)	24 (39.3)	
Tertiary	58 (47.9)	22 (36.1)	
Income			0.404
Low	33 (27.3)	13 (21.3)	
Middle	59 (48.8)	28 (45.9)	
High	29 (24.0)	20 (32.8)	

Abbreviation: PLWHIV, people living with HIV.

Questionnaires

All patients enrolled were completed the following questionnaires, including Self-Rating Depression Scale (SDS), Self-Rating Anxiety Scale (SAS), Symptom Checklist 90 questionnaire (SCL-90) and Short-Form Health Survey (SF-36).

All the subjects finished the questionnaires in a quiet room without any disruptions and implications. They were informed that if they had any problems in understanding the questionnaires, they could seek for professional help.

SDS

SDS questionnaires contains 20 items. A total score was obtained by adding those 20 items scores. The depression score was a total score × 1.25. Patients with depression scores <50 points were divided into non-depression groups, and patients with depression scores ≥50 points were divided into depression groups.[14,15]

SAS

The anxiety score assessed using the SAS was calculated as same as the depression score. The patients with SAS scores of ≥50 points were regarded to have anxiety.[16,17]

SCL-90

The SCL-90 questionnaire contains 90 questions divided into 10 dimensions: somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoia ideation, psychosis, and other items (eg, appetite and sleep).[18,19]

SF-36

SF-36 is a self-administered quality of life questionnaire. SF-36 includes 8 items: physical functioning (PF), role limitations due to physical problems (PRF), bodily pain (BP), general health (GHP), vitality (VIT), social functioning (SRF), role limitations due to emotional problems (ERF), and mental health (MH)). The higher the score, the better the HRQOL.

Statistical Analysis

In our study, we used mean ± standard deviation, and categorical variables to express variable when appropriate. Chi-square test and *t*-test were used to determine whether the results are significantly different. We also used univariate and multivariate logistic regression analysis to determine factors related to depression and anxiety. The significance level was set as $P < 0.05$ (two-tailed). Data analysis and quality control procedures were performed using SPSS 13.0 (Chicago, USA).

Results

Demographic Data of Patients Enrolled

A total of 121 PLWHIV were included and completed the questionnaires. The characteristics are shown in Table 1. There was no significant difference between the PLWHIV and healthy controls, regardless of sex, age, smoking, alcohol consumption, educational level, and income level.

Depression and Anxiety Levels Among PLWHIV

A total 52 people infected with HIV (43.0%) were diagnosed with depression and 28 (23.1%) diagnosed with anxiety. In the comparison between the PLWHIV and healthy controls, we observed that the depression level of PLWHIV were significantly higher than controls (Figure 1A). A similar trend was also observed in the anxiety level (Figure 1B).

Factors Related with Depression and Anxiety in the People Infected with HIV

To determine the related factors associated with depression and anxiety among the PLWHIV. We conducted univariate and multivariate analyses and the results revealed that younger age (OR=0.929, P=0.004) and smoking (OR=4.297, P=0.001) were the independent factors related with depression among the people infected with HIV (Table 2). Furthermore, multivariate analysis revealed that young age (OR=0.890, P=0.008) and alcohol consumption (OR=4.801, P=0.002) were the independent factors related with anxiety (Table 3).

Association of Psychological Symptoms with Depression and Anxiety in the People Infected with HIV

Based on the results of the SCL-90 questionnaire, we evaluated the association of psychotic symptoms with depression or anxiety in the people infected with HIV further. We compared the eight symptom scores based on whether the PLWHIV had depression or anxiety. The analysis showed that hostility, paranoia ideation, and other items (eg, bad appetite and poor sleep quality) were significantly more pronounced when the people infected with HIV had depression than when they had no

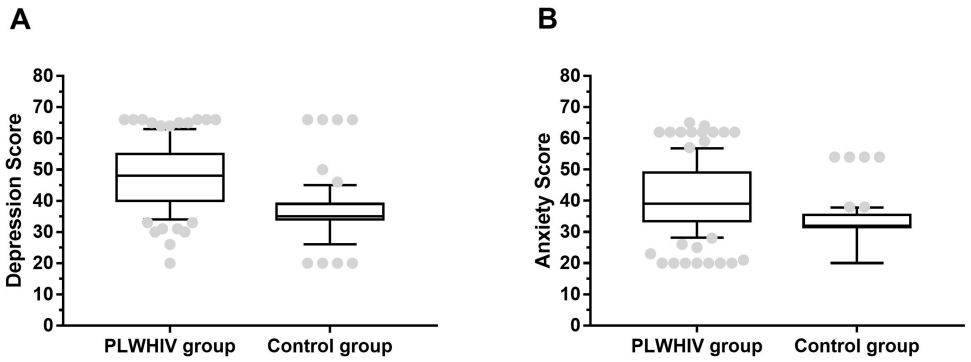

Figure 1 Depression and anxiety scores in two groups. (**A**) The depression score of people live with HIV were 47.83 ± 10.58, significantly higher than in health control with 36.52 ± 9.69 (P<0.001). (**B**) The anxiety score of people live with HIV were 41.06 ± 11.24, compared with 32.31 ± 7.99 of health control (P<0.001).
Abbreviation: PLWHIV, people living with HIV.

depression (Figure 2A). We also compared the scores for the symptoms in the people infected with HIV experiencing anxiety. The analysis showed that all the eight symptoms were more pronounced when the patients had anxiety than when they had no anxiety (Figure 2B).

Association of HRQOL in PLWHIV with Depression and Anxiety

We next evaluate the association of HRQOL in PLWHIV with depression or anxiety. We found that at the quality of life in physiological level and mental health are significantly lower in PLWHIV with depression (Figure 3A). For PLWHIV with anxiety, the vitality, social functioning, and mental health are significant lower (Figure 3B).

To further identify the factors related with poor HRQOL in PLWHIV, univariate and multivariate analyses were conducted. The multivariate analysis revealed that only depression level was the risk factor related with poor HRQOL among PLWHIV (OR=0.370, P=0.001, Table 4). The higher the level of depression in HIV patients, the poorer their level of HRQOL.

Table 2 Factors Associated Depression Among People Living with HIV

Variables	Univariate Analysis			Multivariate Analysis		
	OR	95% CI	P	OR	95% CI	P
Gender	1.548	0.728–3.294	0.256			
Age	0.921	0.877–0.967	0.001	0.929	0.884–0.977	0.004
Level of education	0.965	0.630–1.480	0.871			
Income	1.120	0.677–1.854	0.659			
Smoking	5.026	2.228–11.334	<0.001	4.297	1.837–10.046	0.001
Alcohol consumption	2.187	1.047–4.570	0.037			

Abbreviation: OR, odds ratio.

Table 3 Factors Associated Anxiety Among People Living with HIV

Variables	Univariate Analysis			Multivariate Analysis		
	OR	95% CI	P	OR	95% CI	P
Gender	1.913	0.807–4.532	0.141			
Age	0.882	0.813–0.956	0.002	0.890	0.816–0.970	0.008
Level of education	1.805	1.028–3.170	0.040			
Income	1.574	0.860–2.879	0.141			
Smoking	2.973	1.246–7.096	0.014			
Alcohol consumption	6.000	2.302–15.637	<0.001	4.801	1.772–13.003	0.002

Abbreviation: OR, odds ratio.

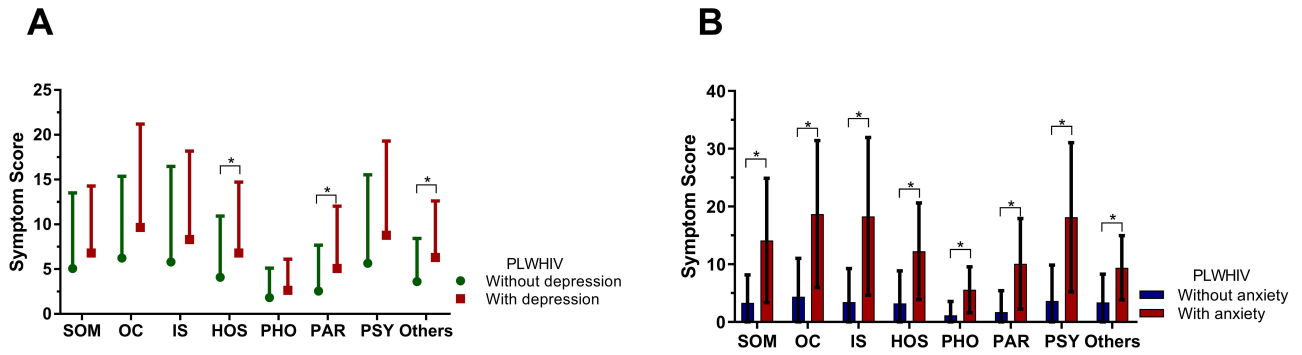

Figure 2 Psychological symptoms in HIV infected patients compared with controls. (**A**) Psychological symptoms were different in PLWHIV with or without depression. SOM: 6.81 ± 7.48 vs 5.08 ± 8.42 (P=0.243); OC: 9.65 ± 11.55 vs 6.23 ± 9.13 (P=0.071); IS: 8.31 ± 9.86 vs 5.81 ± 10.66 (P=0.189); HOS: 6.81 ± 7.91 vs 4.09 ± 6.83 (P = 0.045); PHO: 2.63 ± 3.48 vs 1.83 ± 3.29 (P=0.198);PAR: 5.08 ± 6.96 vs 2.56 ± 5.11 (P=0.023);PSY: 8.79 ± 10.51 vs 5.65 ± 9.89 (P=0.095); Others:6.31 ± 6.31 vs 3.61 ± 4.81 (P=0.008). (**B**) Psychological symptoms were different in PLWHIV with or without anxiety. SOM: 14.11 ± 10.77 vs 3.33 ± 4.81 (P<0.001); OC: 18.68 ± 12.73 vs 4.39 ± 6.64 (P<0.001); IS: 18.29 ± 13.66 vs 3.45 ± 5.79 (P<0.001); HOS: 12.25 ± 8.36 vs 3.22 ± 5.63 (P<0.001);PHO: 5.57 ± 3.98 vs 1.15 ± 2.39 (P<0.001); PAR: 10.07 ± 7.84 vs 1.71 ± 3.71 (P<0.001);PSY: 18.14 ± 12.92 vs 3.65 ± 6.21 (P<0.001); Others:9.39 ± 5.57 vs 3.38 ± 4.89 (P<0.001). *P<0.05.

Abbreviations: HOS, hostility; IS, interpersonal sensitivity; OC, obsessive-compulsive symptoms; PHO, phobic anxiety; PAR, paranoia ideation; PSY, psychosis; and others items (appetite, sleep, etc.); PLWHIV, people living with HIV; SOM, somatization.

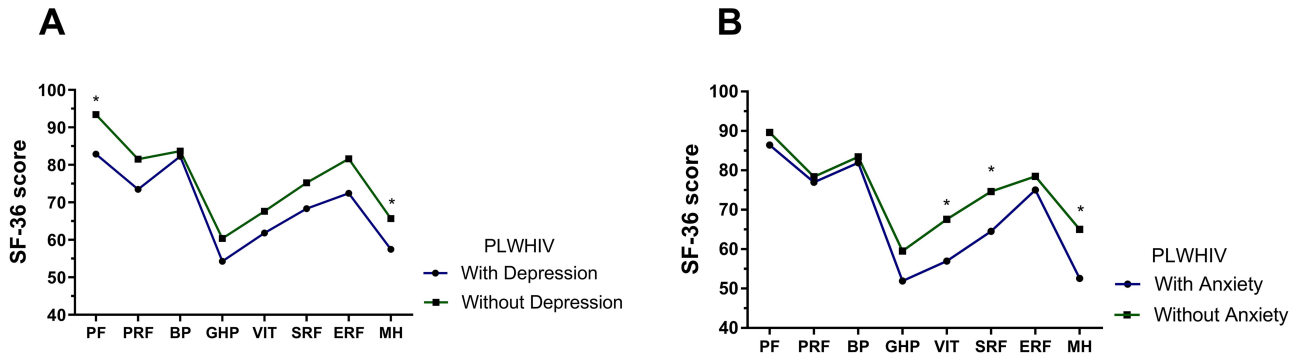

Figure 3 Psychological symptoms in HIV infected patients with anxiety. (**A**) Dimensions of HRQOL were different in PLWHIV with or without depression. PF: 82.88 ± 14.73 vs 93.41 ± 9.22 (P<0.001); MF: 57.46 ± 17.64 vs 65.68 ± 17.44 (P=0.012). (**B**) Dimensions of HRQOL were different in PLWHIV with or without anxiety. VIT: 56.96 ± 14.61 vs 67.58 ± 17.57 (P=0.004); SRF: 64.52 ± 23.97 vs 74.64 ± 21.47 (P=0.036). MH: 52.57 ± 14.21 vs 65.03 ± 17.98 (P=0.001). *P<0.05.

Abbreviations: BP, bodily pain; ERF, emotional role functioning; GHP, general health perceptions; MH, mental health; PF, physical functioning; PRF, physical role functioning; SRF, social role functioning; VIT, vitality; PLWHIV, people living with HIV.

Discussion

A retrospective study showed that the prevalence of depression in people infected with HIV in China is greater than 60% and that the prevalence of anxiety disorders is greater than 40%.[20] Studies conducted by Korean scholars have shown that the prevalence of anxiety and depressive symptoms in people

Table 4 Factors Associated Poor Health-Related Quality of Life Among People Living with HIV

Variables	Univariate Analysis			Multivariate Analysis		
	OR	95% CI	P	OR	95% CI	P
Gender	0.985	0.471–2.215	0.953			
Age	1.018	0.983–1.053	0.321			
Level of education	0.679	0.439–1.051	0.083			
Income	0.817	0.491–1.361	0.438			
Smoking	0.794	0.368–1.714	0.557			
Alcohol consumption	0.658	0.316–1.372	0.265			
Depression level	0.370	0.174–0.788	0.010	0.370	0.174–0.788	0.010
Anxiety level	0.686	0.292–1.614	0.388			

Abbreviation: OR, odds ratio.

infected with HIV is 32% and 36%, respectively;[21] further, even if disease treatment progresses, the negative psychological problems of people infected with HIV will persist for a long time.[22] A survey of people infected with HIV showed that the psychological problems of female patients were significantly more severe than those of male patients.[23] Based on our results, we confirmed that the incidence of depression is high in populations infected with HIV. We further found that this clinical dilemma is more prominent in young patients. Moreover, The higher the level of depression in HIV patients, the poorer their level of HRQOL. Physicians should then pay attention to anxiety disorders and depression in people infected with HIV. Especially for young patients with smoking and alcohol consumption, psychological investigations should be conducted, and timely interventions should be provided.

Among different patients with depression and anxiety, the symptoms may vary, especially in those with chronic diseases.[24,25] For people with HIV infection, understanding the sociological symptoms of depression and anxiety can help in intervening and alleviating these conditions better.[26,27] Our analysis revealed that the patients with HIV infection and depression had more pronounced symptoms associated with psychological abnormalities than the patients with HIV infection without depression. Among them, hostility, paranoia ideation and other items (eg, bad appetite and poor sleep quality) was the most common symptom. Therefore, for people with HIV infection and depression, both immune function and social role improvements are particularly important. Helping people infected with HIV integrate into society may help alleviate their depression. Interestingly, we also found that anxiety is also very common in people infected with HIV. Moreover, people with HIV infection and anxiety disorders have more severe symptoms of psychological abnormalities than patients without anxiety. Providing timely psychological intervention to alleviate paranoia symptoms may help alleviate anxiety symptoms.

Aweto et al showed that PLWHIV benefit greatly from sports.[28] Because of the low cost of this intervention, it is very suitable in developing countries. Another study has suggested that the role of disclosure and discrimination is determinant in HRQOL.[11] Moreover, previously studies have also suggested that the community accompaniment study had significant reductions in rates of depression.[29,30] Novel approaches such as exercise, sigma reduction, or community accompaniment need further research to confirm.

In our study, we found that there were significant differences in HRQOL among PLWHIV with or without depression and anxiety. Further multivariate analysis suggested that depression level was the factors associated with HRQOL. Emphasis needs to be placed on monitoring the mental status and HRQOL of PLWHIV. Psychological intervention may be necessary for PLWHIV at risk of having poor HRQOL, especially for depressed patients. Poor HRQOL and poor psychological conditions may induce poor treatment adherence, which in turn will induce relapse and resistance of virus. It is interesting that whether improving the patient's depression level can increase the HRQOL of PLWHIV. However, it still needs further exploration.

Our study has some limitations. First, we did not consider the severity of the HIV infection. Second, the related small sample size of our study may induce bias. The conclusion generalized need more cautious among all PLWHIV. Third, there is no information provided regarding HIV disease variables in our study. CD4 is closely related to the duration of ART treatment. The length of antiviral time of the patients we enrolled varies, so there is no relationship between CD4 level and depression and anxiety. A multi-center prospective study is still needed.

Conclusions

At present, mental abnormality such as depression and anxiety, are very common, and the incidence is higher in patients with chronic physical diseases. The psychological problems in people infected with HIV are more prominent. Further, people infected with HIV experience both physical and psychological disorders, which seriously affect their HRQOL and treatment outcomes. For virus-induced diseases, especially AIDS, physicians should not only focus on the antiviral treatment of patients (especially younger patients) but also monitor their mental status.[31,32] For patients with depression and anxiety, psychological intervention should be provided, and social role rebuilding, such as helping them integrate into society, may be good for depression alleviation.

Abbreviations

AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; SDS, Self-Rating Depression Scale; SAS, Self-Rating Anxiety Scale; SCL-90, Symptom Checklist 90 questionnaire.

Ethics Approval and Consent to Participate

The Institutional Review Board of First affiliated hospital of Xiamen university had approved this study. All procedures followed were in accordance with the ethical standards of the

responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for inclusion in the study.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

All authors declare that they have no conflicts of interest.

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