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Accuracy of the NEU Screen Detecting Cognitive Impairment in Virologically Suppressed Patients with HIV Infection

Jose A. Muñoz-Moreno[1,2], Anna Prats[1,2], Núria Pérez-Álvarez[1,3], Carmina R. Fumaz[1,2], Maria J. Ferrer[1,2], Maite Garolera[4,5], Bonaventura Clotet[1,6,7]

[1] Lluita contra la SIDA Foundation – Germans Trias i Pujol University Hospital. Barcelona, Catalonia, Spain // [2] Autònoma de Barcelona University. Barcelona, Catalonia, Spain // [3] Politècnica de Catalunya University. Barcelona, Catalonia, Spain // [4] Consorci Sanitari Terrassa Hospital. Barcelona, Catalonia, Spain // [5] Barcelona University - Grup de Recerca Consolidat en Neuropsicologia. Barcelona, Catalonia, Spain // [6] Institut per la Recerca de la SIDA - IrsiCaixa. Barcelona, Catalonia, Spain // [7] Universitat de Vic. Barcelona, Catalonia, Spain.

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Jose A. Muñoz-Moreno, Ph.D.
jmunoz@flsida.org

BACKGROUND

- ✓ Several methods have been proposed to screen for neurocognitive impairment (NCI) in HIV infection, although none of them has achieved a clear consolidation for its use in the clinical practice[1].
- ✓ There is a disparity in terms of potential advantages of these tools, mainly according to the time for administration, instrumental requirements, and the accuracy to screen for impairment[2].
- ✓ The NEU Screen has been recently presented, a tool including 3 cognitive measures with a sensitivity of 74.5% and specificity of 81.8% detecting NCI in HIV population[3].
- ✓ This method is rapid to apply (≤10 minutes for administration), has no copyrights limitations, and is based on a pencil-and-paper use.
- ✓ In this work we aimed to study the accuracy of the NEU Screen detecting NCI in virologically suppressed patients with HIV, and also according to distinct patient profiles.

References:

[1] Valcour V, et al. Screening for cognitive impairment in human immunodeficiency virus. Clin Infect Dis 2011 Oct; 53 (8): 836-42.

[2] Mind Exchange Working Group. Assessment, diagnosis, and treatment of HIV-associated neurocognitive disorder: a consensus report of the mind exchange program. Clin Infect Dis. 2013 Apr;56(7):1004-17.

[3] Muñoz-Moreno et al. A brief and feasible paper-based method to screen for neurocognitive impairment in HIV-infected patients: the NEU screen. J Acquir Immune Defic Syndr. 2013 Aug 15;63(5):585-92.

METHODS

Study Population:
Data from 156 HIV-infected outpatients receiving care in he HIV Unit of the Germans Trias i Pujol University Hospital (Barcelona, Catalonia, Spain) were used for these analyses. They were selected because were ≥18 years old, had undetectable plasma viral load for ≥6 months prior the study assessments, and had not participated in the original study of the NEU proposal.

Study Variables:
Neurocognitive functioning was assessed by the application of a standard comprehensive battery of neuropsychological tests (15 measures, 7 domains). Demographic and clinical variables were also recorded. NCI was defined as performing ≥1 standard deviation below the normative mean in ≥2 cognitive areas. T scores were used for all comparisons and were based on available normative data.

Statistical Analyses:
NCI was considered as gold standard, and sensitivity and specificity tests were applied to study the accuracy of the NEU Screen. A proposal of an abbreviated battery also offered in the NEU Study was additionally tested (7 scores, 7 domains). Logistic regression was used to analyze variables linked to the correct classification. In this regard, we joined the sample of the NEU Study and the sample of the present work to investigate possible links more consistently. In order to study distinct patient profiles in which NCI could be more optimally identified, we also developed analyses in sub-groups of patients separated by representative demographic and clinical factors.

RESULTS

- Subjects were mostly men (81%), getting infected having sex with other men (47%), with a median (interquartile range) age of 43 (38;50) years, current CD4 count of 522 (380;718) cells/µL, and nadir CD4 count of 188 (80;285) cells/µL. The remaining demographic and clinical characteristics are displayed in ***Table 1***.

Table 1. *Characteristics of the study sample.*

	Study sample (N=156)
Age, years	43 (38 ; 50)
Gender, women (%)	29 (19)
Education, years	12 (8 ; 15)
Employed (%)	109 (70)
Homosexual infection route (%)	70 (47)
Time since HIV diagnosis, years	11 (6 ; 15)
Time since first antiretroviral treatment, years	8 (4 ; 11)
Time on current treatment, months	14 (51 ; 139)
Current CD4 cell count, cells/µL	522 (380 ; 718)
Nadir CD4 cell count, cells/µL	188 (80 ; 285)
Zenith plasma viral load, copies/mL	87500 (15750 ; 214000)
AIDS condition (%)	24 (16)
Coinfection with HCV (%)	31 (21)
Potential comorbidities for NCI (%)	42 (27)

Data expressed as medians (interquartile range) except when specified.

- NCI was present in 82 (52%) individuals, of whom 42 (54%) reported cognitive complaints. Rate of impairment was significantly related to time since HIV diagnosis (p=0.01).
- The sensitivity and specifity found for the NEU Screen were 73.1% and 74.3%, respectively, and positive predictive value (PPV) 75.9% and negative predictive value (NPV) 71.4%. When the NEU abbreviated battery was analyzed the sensitivity obtained was 97.5%, the specificity 100%, PPV 100%, and NPV 97.3% (***Table 2***).

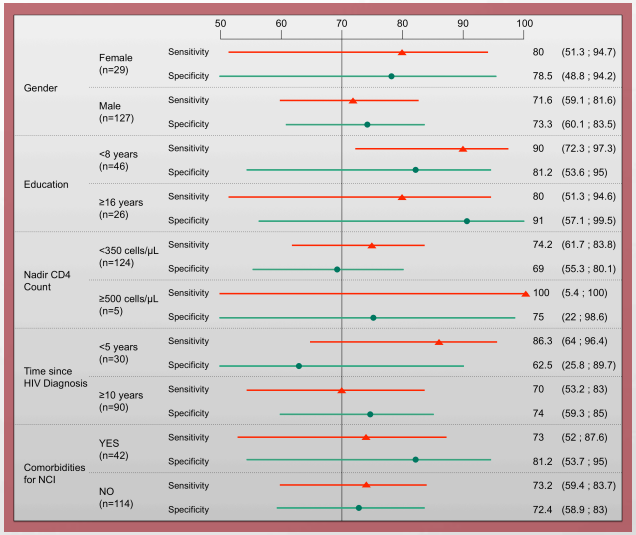
Table 2. *Accuracy of the NEU Screen and the NEU abbreviated battery.*

	Characteristics
NEU Screen	
Sensitivity	73.1 (62 ; 82)
Specificity	74.3 (62.6 ; 83.4)
PPV	75.9 (64.7 ; 84.5)
NPV	71.4 (59.8 ; 80.8)
NEU Abbreviated Battery	
Sensitivity	97.5 (90.6 ; 99.5)
Specificity	100 (93.8 ; 99.8)
PPV	100 (94.2 ; 99.8)
NPV	97.3 (89.9 ; 99.5)

Data expressed as values (95% CI).

- According to logistic regression models none of the demographic or clinical variables were significantly associated with the correct classification. When the NEU Study sample and the present were joined (262 subjects), analyses still did not find any factor in association.

Figure 1. *Accuracy of the NEU Screen according to representative variables.*



Data expressed as values (95% CI).

- When different sub-groups were compared in terms of representative demographic and clinical variables, the highest accuracies were observed in women (sensitivity: 80%, specificity: 78.5%); patients with <8 (90%, 81.2%) or ≥16 (80%, 91%) years of education; and <5 years since HIV diagnosis (86.3%, 62.5%), as shown in ***Figure 1***.

CONCLUSIONS

- ✓ The present work confirms fairly high sensitivity and specificity of the NEU Screen detecting NCI in virologically suppressed HIV-infected patients.
- ✓ This method includes 3 cognitive tests, has an expected time for administration of ≤10 minutes, and is based on a pencil-and-paper use.
- ✓ Demographic and clinical factors, such as gender, education level or immunological status, may play a relevant role in the accuracy of screening tools when detecting NCI in people with HIV.

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