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Health-related quality of life of people with HIV: an assessment of patient related factors and comparison with other chronic diseases

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Objectives: The health-related quality of life (HRQOL) of people with HIV is lower than in the general population, but it is unknown how it compares with that of persons with other chronic medical conditions. We compared HRQOL in HIV with HRQOL in diabetes mellitus type 1, diabetes mellitus type 2 and rheumatoid arthritis (RA). In addition, we investigated factors associated with HRQOL in HIV.

Design: Cross-sectional study.

Methods: HRQOL was measured with the Medical Outcomes Study Short Form 36-item Health Survey in a nationwide sample of people with HIV in care in the Netherlands and on combination antiretroviral therapy for at least 6 months. We added data from studies in diabetes mellitus types 1 and 2, and RA. Logistic regression analysis was used to examine: the association between disease group and a poor HRQOL, and patient factors associated with poor HRQOL in HIV.

Results: The odds of a poor physical HRQOL in the HIV group were comparable with the odds in diabetes mellitus types 1 and 2, but lower than in RA patients. The odds of a poor mental HRQOL in HIV were higher than in the other groups. In HIV, a history of AIDS, longer duration of combination antiretroviral therapy and severe comorbidity were associated with a poor physical HRQOL. Sub-Saharan African descent and $CD4^+$ cell count of less than 350 cells/μl were associated with poor mental HRQOL.

Conclusion: People with HIV were more likely to have a poor mental HRQOL than patients with other chronic conditions. Addressing mental health should be an integral part of outpatient HIV care.

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Keywords: chronic disease, diabetes mellitus, health-related quality of life, HIV, rheumatoid arthritis

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Introduction

Owing to the advances in treatment options, HIV infection is nowadays considered to be a chronic and increasingly manageable disease [1]. In chronic disease management, improving health-related quality of life (HRQOL) has gained growing significance. The HRQOL of people with HIV is generally lower than that of the general population, but it is unknown how it compares with that of people with other chronic conditions [2]. There may be factors unique to HIV infection, such as the communicable character of the disease, and the ongoing widespread stigma [3–5], that lead to greater impairment of HRQOL than in other conditions. In this study, we compared HRQOL of people living with HIV to that of patients with diabetes mellitus types 1 and 2, and rheumatoid arthritis (RA). These diseases are (highly) prevalent somatic chronic conditions with a considerable disease burden, but manageable when there is access to medication and long-term care.

Previous studies found that HIV-related symptoms, medication side effects, impaired immunological status, comorbidities and low socio-economic status (SES) were associated with a greater risk of an impaired HRQOL in HIV [6]. However, considering the rapid development of the treatment of HIV, results from older studies may not be fully applicable to patients in the era of modern combination antiretroviral therapy (cART). For instance, there has been important progress in developing more tolerable cART. Consequently, HRQOL affecting side effects, such as diarrhoea, lipodystrophy and fatigue [1], may currently play a less important role in the lives of people with HIV.

The aim of this study was to compare HRQOL of people with HIV with that of patients with three other chronic diseases, and investigate patient factors associated with HRQOL in HIV.

Methods

We conducted a cross-sectional study between July 2013 and December 2014, assessing HRQOL in a national sample of HIV-infected patients on cART in the Netherlands. In addition, we obtained HRQOL data from three studies that were previously carried out in the Netherlands among patients with diabetes mellitus types 1 and 2, and RA [7–10].

Study population

In the Netherlands, the care for HIV-infected patients is centralized within designated HIV treatment centres. Data of all these patients are obtained in the Dutch national observational cohort ATHENA, maintained by Stichting HIV Monitoring [11]. We selected 1000 patients in outpatient care on 25 February 2013, diagnosed at age 18 or older, and using cART for at least 6 months. In our aim to include participants from each of the 26 treatment centres, we took samples from each centre (at least 20 patients per treatment centre), rather than one sample from the entire HIV-infected population. The sample sizes ranged from 22 to 93 patients, depending on the size of the treatment centre (larger samples in higher HIV volume centres).

To obtain individual HRQOL data from other chronic diseases, we approached researchers of studies that took place after 2008 (5 years prior to our data collection), and in which HRQOL was assessed using the Medical Outcomes Study Short Form 36-item Health Survey (MOS SF-36)/RAND 36-Item Health Survey instruments, among patients with diabetes mellitus types 1 and 2, and RA. A brief description of the included studies is as follows:

Diabetes mellitus type 1

This prospective cohort study assessed HRQOL and other disease factors (e.g. oxidative stress) in patients with diabetes mellitus type 1 [7,12]. Diabetes mellitus type 1 was defined as the initiation of insulin therapy within 6 months after the presentation of diabetes, under the age of 30 years, or the absence of C-peptide secretion. Patients at the Isala Hospital were invited to participate between January 1995 and January 1996. A total of 281 out of 293 patients participated and follow-up measurements took place annually over a period of 15 years. For this study, we used 2010 data ($n = 119$) (Table 1).

Diabetes mellitus type 2

In this randomized controlled patient-preference equivalence trial, the (cost-/)effectiveness of 3-monthly versus 6-monthly monitoring in well controlled diabetes mellitus type 2 patients was studied [8]. Patients aged 40–80 years, diagnosed with diabetes mellitus type 2 for more than 1 year, not on insulin treatment and well controlled were eligible for participation. In total, 2215 patients from 233 general practitioners were included between April 2009 and August 2010. We used the baseline data ($n = 2114$) (Table 1).

Rheumatoid arthritis

The aim of this multicentre, single-blinded RCT, was to evaluate different induction treatment strategies in early RA [9,10]. Patients were recruited from eight participating rheumatology centres between July 2007 and April 2011. Inclusion criteria were an age of at least 18 years, arthritis in at least one joint and a symptom duration of less than 1 year. The data we used ($n = 250$) were collected 12 months after inclusion/initiation of treatment ($n = 216$); or 9 ($n = 22$) or 6 months ($n = 12$), where recent data were missing (Table 1).

Table 1. Characteristics of the four study populations.

Condition	HIV infection[a]	DM type 1[b]	DM type 2[c]	Rheumatoid arthritis[d]
Study design (years)	Cross-sectional, 2013	Prospective cohort, 1995–2010	Pragmatic RCT, 2009–2010	Single-blinded RCT, 2007–2011
No. of included patients	331	119	2114	250
Age, mean (SD)	51 (11.2)	52 (10.1)	64 (8.8)	53 (13.7)
Male sex, *n* (%)	281 (85%)	75 (63%)	1256 (59%)	83 (33%)
Region of origin (%)	77% NL, 8% SSA, 15% other	100% NL	93% NL	84% NL
SES (%)				
High	28	Not available	20	36
Middle	34		34	46
Low	36		38	13
Unknown	2		8	5
Years since diagnosis, median (IQR)	11 (7–16)	29 (21–37)	5 (3–8)	1 (1.0–1.1)

DM, diabetes mellitus; IQR, interquartile range; NL, the Netherlands; RCT, randomized controlled trial; SES, socio-economic status; SSA, sub-Saharan Africa.
[a]Q-HIV study.
[b]FANTA study [12].
[c]EFFIMODI study [8].
[d]tREACH study [9].

Data-collection and ethical considerations

For the HIV study sample, HIV nurse consultants approached the selected patients during their next outpatient visit. Patients were provided with an information letter and a password for accessing an online version of the questionnaire, in Dutch or English. A paper version was also available. We received individual data (including age, sex, date of diagnosis and scores on the 36 items) from the other studies, collected using the Dutch, paper version of the questionnaire.

Our study was exempted from *written* informed consent by the Medical Ethics Review Committee of the Academic Medical Centre of the University of Amsterdam. We considered informed consent implicit when a questionnaire was returned to us. The other studies received approval from local Medical Research Ethics Committees, and all participants gave written informed consent.

Health-related quality of life

HRQOL was measured using the MOS SF-36 (HIV and RA samples) or RAND-36 (diabetes mellitus types 1 and 2) survey. Both instruments have extensively been validated and consist of the same 36 items, but differ slightly in terms of item wording in the Dutch versions [13].

The 36 items can be used to form eight domains of HRQOL: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health. The first four are closely related to 'physical HRQOL', whereas the others are mainly 'mental HRQOL' related. The subscale scores can be used to calculate a physical component score (PCS) and a mental component score (MCS). These scores have been shown to be valid in discriminating between physical and mental health status and have the advantage of reducing the number of statistical comparisons [14]. Higher scores indicate better HRQOL.

Socio-demographic and clinical factors in the HIV sample

We extracted patient factors from the ATHENA cohort database, the socio-demographic factors being: age, sex, region of origin and SES. Region of origin was based on the country of birth and grouped into the Netherlands, sub-Saharan Africa (SSA) and other. For SES we used a classification system previously described by the Netherlands Institute for Social Research [15]. The classification is based on the percentage of households with a low income, unemployed persons and persons with a low educational level living within an area code. The original five classes (very high to very low) were recoded here as high, middle or low.

We extracted the clinical factors: HIV transmission route, categorized as MSM, heterosexual contact or other/unknown (including injecting drug use, blood (products), needle accidents and vertical transmission); recent $CD4^+$ cell count as a measure of immunological status and dichotomized according to a clinically relevant threshold of 350 cells/μl [16]; history of an AIDS-defining event (yes/no), according to the 'Centres for Disease Control and Prevention' classification [17], time since cART initiation; time since diagnosis; current antiretroviral regime, defined in four (anchor drug based) categories: ['Boosted PI'; 'nonnucleoside reverse-transcriptase inhibitors (NNRTI): Efavirenz' (separately because of its reported association with onset of depression [18]), 'NNRTI not Efavirenz' and other]; history of hepatitis C virus treatment with (pegylated) interferon (yes/no); and history of comorbidity, defined in three categories: no comorbidities, severe comorbidity (history of

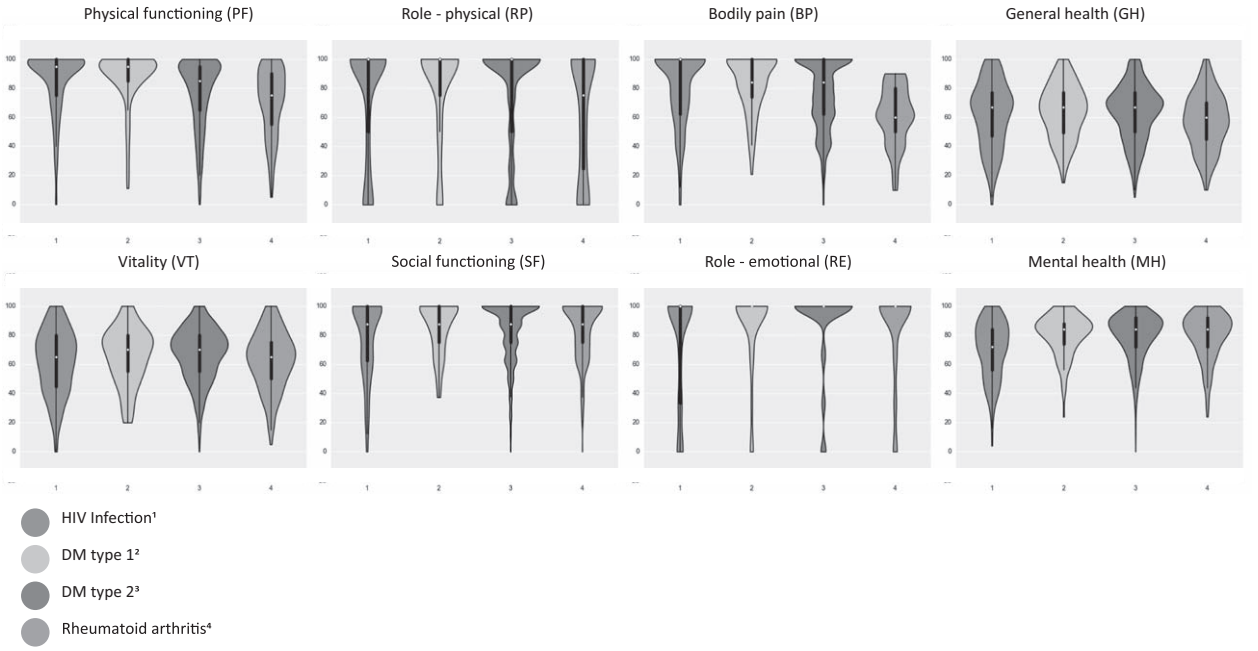

Fig. 1. Violin plots: distribution of eight Short Form 36-item Health Survey domains in the four study populations. The white dots and black bars represent the median scores and interquartile ranges, respectively.

cardiovascular event, end-stage renal disease, non-AIDS malignancy, insulin therapy for diabetes mellitus) and secondary prevention (patients prescribed medication for comorbid conditions including antihypertensive therapy, lipid-lowering drugs, oral blood glucose-lowering drugs, osteopathy; but without a history of severe comorbid events as defined above).

Statistical analysis

We combined the individual data of all disease groups. We calculated the eight subscale and two summary scores, using standard procedures for dealing with missing scores [19]. The distributions of the eight subscale scores (Fig. 1) were illustrated using violin plots (similar to box plots but showing the underlying probability density distribution) [20]. We used two logistic models to assess the association between chronic disease and PCS or MCS. In both models, we corrected for age, sex and region of origin (the Netherlands/other). As SES assessment methods varied, we chose not to correct for SES in the PCS/MCS models. Due to the skew distribution of the data, and in the absence of a generally accepted poor HRQOL cut-off score, we dichotomized PCS and MCS on the basis of the HIV sample distribution. A score in the first quartile indicated a poor PCS/MCS, as in previous similar studies [21,22].

For the HIV sample, we used χ^2 analysis, independent two sample t test and Mann–Whitney U to compare characteristics of respondents versus nonrespondents. The association between patient factors and poor PCS/MCS scores was analysed separately, using logistic regression. In nonlinear relationships, we categorized continuous variables by computing quartiles. Variables with a univariate P value of less than 0.2 were considered potential associated factors and entered in the two multivariable models. Collinearity statistics were performed with Cramérs V, and where high ($\geq$0.5) [23], the variable that we considered most relevant was included. For the PCS multivariable analysis, we combined sex and transmission route to create the categories: MSM, heterosexual man, heterosexual woman and other. All analyses were performed with Stata Statistical Software: Release 13 StataCorp LP, College Station, Texas, USA).

Results

Study population

The characteristics of the study populations are presented in Table 1. Of the selected 1000 HIV-infected patients, 958 were eligible for participation (i.e. had not recently died, migrated or switched to another centre). A total of 331 patients from all HIV-treatment centres in the Netherlands responded (35%). The proportions of men (85%), patients from the Netherlands (77%) and MSM (71%) were significantly higher among respondents than among nonrespondents (73, 50 and 48%, respectively). Respondents were significantly older (mean: 51 versus 47 years), had a significantly higher SES, but did not differ with regard to duration of HIV infection or time since cART initiation.

Table 2. Median scores and interquartile range for the eight Short Form 36-item Health Survey domains, and two component scores in the four study populations.

Domain	HIV infection[a] Median (IQR)	DM type 1[b] Median (IQR)	DM type 2[c] Median (IQR)	Rheumatoid arthritis[d] Median (IQR)
PF	95.0 (75.0–100)	95.0 (85.0–100)	85.0 (65.0–95.0)	75.0 (55.0–90.0)
RP	100 (50.0–100)	100 (75.0–100)	100 (50.0–100)	75.0 (25.0–100)
BP	100 (62.0–100)	84.0 (74.0–100)	84.0 (62.0–100)	60.0 (50.0–80.0)
GH	67.0 (47.0–77.0)	67.0 (47.0–77.0)	67.0 (50.0–77.0)	60.0 (45.0–70.0)
VT	65.0 (45.0–80.0)	70.0 (55.0–80.0)	70.0 (55.0–80.0)	65.0 (50.0–75.0)
SF	87.5 (62.5–100)	87.5 (75.0–100)	87.5 (75.0–100)	87.5 (75.0–100)
RE	100 (33.3–100)	100 (100–100)	100 (100–100)	100 (100–100)
MH	72.0 (56.0–84.0)	84.0 (72.0–88.0)	84.0 (72.0–92.0)	84.0 (72.0–92.0)
PCS	**53.3 (44.3–56.9)**	**52.3 (45.9–55.7)**	**50.0 (40.9–54.3)**	**42.0 (32.5–49.4)**
MCS	**50.7 (40.0–56.3)**	**54.9 (47.3–58.0)**	**56.4 (51.4–59.4)**	**57.7 (50.7–60.8)**

BP, bodily pain; DM, diabetes mellitus; GH, general health; IQR, interquartile range; MCS, mental component score; MH, mental health; PCS, physical component score; PF, physical functioning; RE, role-emotional; RP, role-physical; SF, social functioning; VT, vitality. Bold denotes the composite scores.
[a]Q-HIV study.
[b]FANTA study [12].
[c]EFFIMODI study [8].
[d]tREACH study [9].

Health-related quality of life in HIV versus diabetes mellitus type 1, type 2 and rheumatoid arthritis

Median scores and the distribution of the eight subscale scores are presented in Fig. 1 and Table 2. For the domains physical functioning, role-physical, bodily pain and general health, the subscale scores in the HIV sample were comparable with, or higher than, the other three diseases. The RA sample scored lowest in these physical domains. The mental health score was lowest in the HIV sample. Although the medians of role-emotional scores were high (100) across all illnesses, the distribution differed, with relatively more low scores among patients with HIV. The same applies to the vitality domain, albeit to a lesser extent.

Compared with HIV, the odds (adjusted) of having a poor PCS were significantly higher in RA [odds ratio (OR): 3.12; 95% confidence interval (CI): 2.16–4.51, Table 3]. The odds of having a poor MCS were significantly lower in the three other conditions (*diabetes mellitus type 1:* OR: 0.35; 95% CI: 0.18–0.70; *diabetes mellitus type 2:* OR: 0.32; 95% CI: 0.23–0.47; *RA:* OR: 0.28; 95% CI: 0.17–0.47), compared with HIV.

Patient factors associated with poor physical and mental health-related quality of life in HIV

Table 4 shows the odds of having a poor PCS/MCS in the HIV group. In the multivariable analyses, the 'other/unknown' route of transmission group (including injecting drug use, blood, needle accidents and vertical transmission; OR: 3.80; 95% CI: 1.22–11.8) and a history of AIDS (OR: 1.84; 95% CI: 1.01–3.35) were associated with a poor PCS. In addition, the

Table 3. Crude and adjusted associations between study population (chronic disease) and poor physical component score and mental component score health-related quality of life.

	PCS		MCS	
Study population	Crude OR (95% CI)	OR[a] (95% CI)	Crude OR (95% CI)	OR[a] (95% CI)
Chronic disease				
HIV[b]	ref	Ref	ref	ref
DM type 1[c]	0.82 (0.49,1.36)	0.75 (0.44,1.26)	0.32** (0.16,0.62)	0.35***(0.18,0.70)
DM type 2[d]	1.25 (0.96,1.64)	0.94 (0.70,1.27)	0.27*** (0.20,0.36)	0.32***(0.23,0.47)
Rheumatoid arthritis[e]	4.19***(2.94,5.98)	3.12 ***(2.16,4.51)	0.32 ***(0.19,0.52)	0.28 ***(0.17,0.47)

CI, confidence interval; DM, diabetes mellitus; MCS, mental component score; PCS, physical component score.
[a]Adjusted for age, gender and region of origin (the Netherlands or others). Asterisks represent significance level.
*$P < 0.05$.
**$P < 0.01$.
***$P < 0.001$.
[b]Q-HIV study.
[c]FANTA study [12].
[d]EFFIMODI study [8].
[e]tREACH study [9].

Table 4. Univariable and multivariable associations between patient factors and poor physical component score and mental component score health-related quality of life among people with HIV in care in the Netherlands.

	PCS		MCS	
Characteristic	Univariable OR (95% CI)	Multivariable OR (95% CI)	Univariable OR (95% CI)	Multivariable OR (95% CI)
Age (years)				
<40	ref	Ref	ref	–
40–50	1.02 (0.45, 2.31)	1.18 (0.46, 3.07)	0.77 (0.37, 1.61)	
50–60	1.04 (0.46, 2.36)	1.14 (0.41, 3.16)	0.71 (0.34, 1.50)	
>60	**2.40* (1.06, 5.43)**	2.13 (0.77, 5.89)	0.64 (0.28, 1.44)	
Sex[a]				
Male	ref	Omitted[a]	ref	–
Female	**2.40**** (1.28, 4.53)		1.12 (0.56, 2.23)	
Transmission risk group[a]				
MSM	ref	Omitted[a]	ref	ref
Heterosexual contact	**1.82* (1.02, 3.25)**		1.54 (0.86, 2.75)	0.90 (0.42, 1.91)
Other[b]/unknown	**5.03**** (1.8, 13.43)**		1.81 (0.65, 5.07)	1.05 (0.33, 3.36)
Sex and/or route of transmission[a]				
MSM	**ref**	ref	Omitted[a]	Omitted[a]
Heterosexual, male	1.29 (0.55, 3.03)	0.84 (0.32, 2.25)		
Heterosexual, female	**2.30* (1.15, 4.59)**	2.12 (0.94, 4.81)		
Other[b]/unknown	**5.03**** (1.88, 13.4)**	**3.80* (1.23, 11.8)**		
Region of origin				
Netherlands	ref	–	ref	ref
Sub-Saharan Africa	1.57 (0.68, 3.66)		**4.1***** (1.84, 9.12)**	**4.35**** (1.58, 12.0)**
Other	1.23 (0.61, 2.48)		0.82 (0.37, 1.79)	0.84 (0.33, 1.92)
Socio-economic status				
High	ref	ref	ref	–
Middle	1.70 (0.88, 3.31)	1.63 (0.78, 3.40)	1.26 (0.64, 2.47)	
Low	1.48 (0.76, 2.90)	1.41 (0.67, 2.98)	1.51 (0.78, 2.91)	
$CD4^+$ cell count at participation (cells/μl)				
<350	ref	ref	ref	ref
≥350	**0.50* (0.25, 0.97)**	0.62 (0.29, 1.34)	**0.38* (0.20, 0.75)**	**0.45* (0.22, 0.92)**
History of AIDS event (CDC category C)				
No	ref	ref	ref	ref
Yes	**2.38**** (1.40, 4.06)**	**1.84* (1.01, 3.35)**	1.67 (0.97, 2.89)	1.43 (0.79, 2.58)
Time since diagnosis, per 10 years[c]	**2.11***** (1.39, 3.18)**	–	1.42 (0.95, 2.14)	1.38 (0.88, 2.17)
Time since cART initiation, per 10 years	**2.52***** (1.52, 4.18)**	**1.90* (1.06, 3.40)**	1.22 (0.75, 1.98)	–
Current cART combination				
Boosted PI	ref	ref	ref	ref
NNRTI: Efavirenz	**0.44* (0.21, 0.92)**	0.47 (0.21, 1.06)	**0.39* (0.18, 0.84)**	0.56 (0.25, 1.28)
NNRTI: other	0.96 (0.51, 1.76)	0.71 (0.35, 1.43)	1.00 (0.54, 1.88)	1.17 (0.59, 2.34)
Other	1.27 (0.53, 3.02)	0.77 (0.29, 2.04)	1.75 (0.75, 4.09)	1.90 (0.76, 4.72)
History of HCV treatment				
No	ref	–	ref	ref
Yes	0.96 (0.34, 2.71)		2.03 (0.81, 5.10)	2.08 (0.77, 5.63)
Comorbidity				
None	ref	ref	ref	–
Severe comorbidity	**3.00***** (1.62, 5.58)**	**2.39* (1.15, 4.97)**	1.13 (0.60, 2.13)	
Secondary prevention[d]	1.78 (0.96, 3.30)	1.36 (0.65, 2.81)	1.00 (0.54, 1.82)	

CART, combination antiretroviral therapy; CDC category C, presence of AIDS defining conditions according to the 'Centres for Disease Control and Prevention' classification; CI, confidence interval; HCV, hepatitis C virus; MCS, mental component score; NNRTI, nonnucleoside reverse-transcriptase inhibitors; PCS, physical component score; PI, protease inhibitor. Bold denotes significant OR. Asterisks represent significance level.
*$P < 0.05$.
**$P < 0.01$.
***$P < 0.001$.
[a]Sex and transmission risk group were combined for the multivariable PCS model.
[b]Injecting drug use, blood (products), needle accident, vertical transmission.
[c]Not included in (PCS) multivariable model because of collinearity with time since cART initiation.
[d]Receiving treatment for comorbid conditions but excluding patients with a history of severe comorbidity (defined as: history of cardiovascular event, end stage renal disease, non-AIDS malignancy, insulin therapy).

odds increased significantly with the time since cART initiation (OR: 1.90; 95% CI: 1.06–3.40 per 10 years). Finally, having severe comorbidity (versus no comorbidity) was significantly associated with a poor PCS (OR: 2.39; 95% CI: 1.15–4.97).

A poor MCS (multivariable analysis) was more common among patients from SSA, compared with Dutch patients (OR: 4.35; 95% CI: 1.58–12.0). Patients with higher $CD4^+$ cell counts were less likely to have a poor MCS (OR: 0.45; 95% CI: 0.22–0.92).

Discussion

The current study compared HRQOL in well controlled people with HIV on cART in the Netherlands with that of patients with three other chronic medical conditions, that is diabetes mellitus types 1 and 2 and RA. The odds of having a poor physical HRQOL in HIV were similar to those in diabetes mellitus types 1 and 2, and significantly lower than in RA. However, people with HIV were significantly more likely to have a poor mental HRQOL than patients with the other conditions. In HIV, a history of AIDS, longer time since cART initiation and severe comorbidity were associated with a poor physical HRQOL. Originating from SSA and poor immunological status were associated with a poor mental HRQOL.

Comparison of health-related quality of life across the four diseases

RA patients reported the poorest HRQOL on the physical domains, which is not surprising as RA is a musculoskeletal disorder. The HRQOL scores in our HIV sample were significantly higher than those reported in previous HIV studies performed in Italy [22,24] and France [25], perhaps because these studies were carried out in the beginning of the cART era and included patients not on cART.

Of the eight HRQOL domains, mental health stood out as impaired in HIV. In addition, the HIV sample scored relatively unfavourable levels of emotional functioning and vitality, suggesting that mental problems play a more prominent role in HIV-positive patients' lives than problems in physical HRQOL. This is consistent with the results of a large study among HIV-infected patients in the United Kingdom, in which the anxiety/depression domains of the EQ-5D-3L instrument were most noticeably affected [26].

HIV patients were significantly more likely to report a poor mental HRQOL than in the other conditions. Although perceived stigma, an important cause of psychological distress [27], has been reported in diabetes mellitus types 1 [28,29] and 2 [30], and RA [31], it may play a more prominent role in HIV/AIDS [32,33]. People with HIV face difficulties regarding how to disclose their status and cope with possible negative consequences [34]. In addition, socially disadvantaged people may be particularly vulnerable to acquiring HIV infection. For instance, people with poor education/unemployment or with a history of (childhood) violence, may be more likely to engage in HIV risk behaviours [35–37].

Patient factors associated with low health-related quality of life in HIV

In accordance with previous studies [6,7,13,19,38,39], a poor physical HRQOL was more common among female patients and patients with a history of AIDS [1,6]. The odds of having a poor physical HRQOL increased with duration of cART usage, suggesting that accumulation of its toxic effects negatively impacts physical HRQOL. Finally, as hypothesized, patients with severe comorbidity were at greater risk for a poor physical HRQOL [6].

In contrast with previous studies [6], lower SES was not associated with an impaired HRQOL. This may be because, due to mandatory full-coverage health insurance, all HIV-infected patients in the Netherlands have access to HIV care. The results correspond with our previous study, in which SES was not associated with the outcomes viral suppression, using cART, or being retained in care [40], and suggest that good healthcare access may decrease (SES-related) disparities in HRQOL.

A poor mental HRQOL was more common among patients from SSA. Possibly, patients with HIV from this region experience more stigmatization, as reported previously in the Netherlands [41] and France [42]. In addition, difficulties related to migration, social marginalization and perhaps the circumstances that led patients to leave their country may play a role in the mental wellbeing of this group. Finally, in line with previous research [6], a poor mental HRQOL was more common in patients with an impaired immune status.

Strengths and limitations

To the best of our knowledge, this is the only study in the modern cART era to compare HRQOL in HIV with that in other chronic conditions. A major strength of this study is that we have data from a national sample of HIV-infected patients. In addition, our access to individual patient data (versus aggregated data) facilitated adjustment for patient factors. However, an important limitation of comparing HRQOL across different datasets is that the observed differences may not be directly attributable to the diversity of the diseases, but could result from other unmeasured differences among the chronic disease populations. Although we adjusted for major confounders of HRQOL: age, sex and region of origin, we were unable to adjust for other potential confounders such as SES, sexual orientation and substance use because of inconsistent recording across data sets. In addition, we did not correct for disease severity, an important HRQOL predictor, as it is difficult to capture with one variable.

Another limitation is the fact that the samples of the other three diseases are not cross sections of the national patient populations. The diabetes mellitus type 2 and RA samples were recruited in a trial setting, with strict inclusion criteria and the diabetes mellitus type 1 participants were recruited in one treatment centre. Furthermore, the fact that duration of illness differs considerably across the illness complicates the comparison of the scores. In particular, the RA group had a relatively short duration of illness. Given that previous studies report a rapid treatment-associated improvement and stabilization of

disease activity [43] and HRQOL in RA (<7 months) [44,45], we do not consider it likely that this played a major role in our results.

Although we aimed to recruit a group of HIV-infected patients representative of the total population of people with HIV in the Netherlands, men (85%), patients originating from the Netherlands (77%) and MSM (71%) were overrepresented. However, globally, the proportions of these characteristics correspond with those of the total HIV-infected population, consisting mainly of men (81%), patients from the Netherlands (60%) and MSM (62%) [46]. We therefore believe our results are relevant for research and practice in this setting, and in countries with similar epidemics (predominantly MSM) and good access to care. With regard to our outcome measure, the role-physical, role-emotional and social functioning subscales show a ceiling effect, therefore limiting our ability to observe potential differences in the high score ranges. Furthermore, it must be noted that our threshold for poor HRQOL was based on the distribution in the HIV sample.

Implications

Our results suggest that mental HRQOL is more impaired in HIV than in diabetes mellitus types 1 and 2, and RA. Therefore, the management of mental health problems may require more attention in HIV care than in other somatic chronic diseases. In the Netherlands, the Dutch Association of HIV-treating Physicians recommends using the European AIDS clinical guidelines for screening for mental health problems [47], which suggest screening every 1 or 2 years, using two questions (regarding feeling depressed and loss of interest in activities). We recommend that HIV treatment teams critically assess whether their screening methods suffice in identifying mental health problems on time. With regard to the treatment of mental disorders, the HIV treatment centres are required to provide access to mental health services. In practice, this is either within the health facility or through external referral. Integrating mental health services into HIV care may improve access to services [48]. We suggest that treatment centres evaluate whether integration is feasible, and if not, which activities can be undertaken to maintain the expertise of the collaborating mental health professionals (e.g. training and meetings). Moreover, our data show that poor mental HRQOL may be an important problem among patients born in SSA, the largest group of immigrants with HIV in the Netherlands (14% of the total HIV-infected population) [11], suggesting that healthcare workers should be especially attentive to mental health problems among patients from this region. It is important to note, however, that mental health problems cannot be considered separate from the social circumstances people find themselves in. Rather, in addition to mental health services, a structural response is required, that tends to the needs of vulnerable groups (in this case, people from SSA), for instance by tackling social marginalization and discrimination, and creating employment opportunities.

Patients with a history of AIDS were at greater risk for poor physical HRQOL. In our setting, in which all patients have access to cART, this further underlines the importance of early diagnosis. Although the proportion of late presenters in the Netherlands has decreased over time, 29% of patients presenting for care in 2015 had advanced HIV disease (i.e. $CD4^+$ cell count <200 cells/μl or AIDS) [46]. This study also shows that patients with severe comorbidity are particularly disadvantaged in terms of physical HRQOL. Intensified efforts are needed to develop interventions to prevent and treat comorbidities, and help improve HRQOL in this specific population, especially considering the fact that this group will be growing in the coming years [49]. Finally, the long-term toxic effects of newer generation cART regimens should be closely monitored so that the advantages of early initiation of cART can be weighed against the disadvantages.

Conclusion

People with HIV were significantly more likely to have a poor mental HRQOL than patients with other long-term somatic diseases. Addressing mental health should be an integral part of outpatient HIV care.

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Conflicts of interest

S.E.G. has served on an advisory board for Gilead Sciences. K.B. serves on advisory boards for MSD, Gilead, BMS, Viiv and Janssen, for which he has received remuneration.

E.A.N.E., C.S., T.M.K, P.R.V.D., M.R.D.B., A.E.W. and P.T.N. report no potential conflicts.

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