

Chronic illness burden and quality of life in an aging HIV population

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(Received 18 February 2012; final version received 9 July 2012)

The population of persons living with HIV (PLWH) is growing older and more prone to developing other chronic health conditions. Disease progression has been shown to be related to quality of life (QoL). However, descriptions of chronic comorbid illnesses and the unique QoL challenges of older adults living with HIV are not well understood and have not been examined in multiple geographic locations. About 452 PLWH aged 50 years or older were recruited from AIDS Service Organizations in nine states. Participants completed a telephone survey that included measures of other chronic health conditions, perceived stress, depression, and health-related quality of life. As much as 94% of the sample reported a chronic health condition in addition to HIV (mode = 2). The highest reported conditions were hypertension, chronic pain, hepatitis, and arthritis. Despite relatively high rates of depression, overall QoL was moderately high for the sample. Physical functioning was most impacted by the addition of other chronic health problems. Social functioning, mental health functioning, stress, and depression were also strongly associated with chronic disease burden. Additional chronic health problems are the norm for PLWH aged 50 years and older. QoL is significantly related to the addition of chronic health problems. As increasing numbers of PLWH reach older age, this raises challenges for providing comprehensive healthcare to older PLWH with multiple chronic conditions.

Keywords: HIV; older adults; chronic illness; quality of life

Introduction

The number of persons aged 50 years and older living with HIV/AIDS has been increasing over the past two decades (Center for Disease Control and Prevention [CDC], 2008; Mack & Ory, 2003). More middle-aged and older adults are contracting new HIV infections, and more people living with HIV (PLWH) disease are living longer due to medical treatment advances (Justice & Weissman, 1998; Levy, 1998; Mack & Ory, 2003; Stall & Catania, 1994). The cumulative number of AIDS cases among persons aged 50 and older quintupled between 1990 and 2001 (Mack & Ory, 2003) and rose again by 77% between 2001 and 2005, accounting for 25% of all HIV cases and 29% of all persons living with AIDS in the USA (CDC, 2008; Martin, Fain, & Klotz, 2008). The CDC estimates that by 2015 over half of the HIV-positive population in the US will be 50 years or older (Smith, 2005). This dramatic rise in the number of older PLWH may have important implications for medical outcomes, functional status, and quality of life (QoL). Older persons may not respond as well to treatment as younger persons due to being diagnosed later in the disease course if needs for HIV testing are more slowly recognized (Girardi et al., 2004), having less reserve immune functioning, having more comorbid

medical conditions, or experiencing more medication side effects (Centers for Disease Control and Prevention [CDC], 1998; Justice & Weissman, 1998; Skiest, 2003).

The interaction of HIV with the aging process and common comorbidities of aging are expected. In those with long-term HIV infection, the persistent activation of immune cells by the virus likely increases the susceptibility of these individuals to inflammation-induced diseases and diminishes their capacity to fight certain diseases (Appay & Sauce, 2008). Coupled with the aging process, the extended exposure of these older adults to both HIV and antiretroviral drugs appears to increase their risk of illness and death from HIV associated non-AIDS conditions (HANA) such as cardiovascular, bone, kidney, liver, and lung disease, as well as many cancers not associated directly with HIV infection (Fauci, Hodes, & White-scarver, 2010; Guaraldi et al., 2011). In addition, a growing number of adults in their 40s and 50s with long-term HIV infection and treatment are experiencing syndromes that resemble premature aging. For instance, these individuals have a greater risk of impaired kidney function, end-stage renal disease, (Eggers & Kimmel, 2004) osteoporosis (Brown & Qaqish, 2006), and show signs of accelerated frailty (Desquilbet et al., 2007). In one large observational

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study of older PLWH in New York City, 91% of the sample reported at least one other chronic condition in addition to HIV, and 77% reported two or more comorbidities (Brennan, Karpiak, Shippy, & Cantor, 2009). In a large sample of US veterans (Goulet et al., 2007) found lower rates of comorbid conditions among those HIV-positive above the age of 50 with about 53–66% reporting a comorbid condition. In addition, their sample showed an interaction between age and HIV, in that patients that are HIV-positive are more likely to have a comorbid illness as they get older compared to their HIV-negative counterparts. Another interesting finding was that the HIV-negative persons reported higher rates of comorbid conditions compared to those who were HIV-positive (Goulet et al., 2007).

Since HIV has become a chronic disease with the prospect of long-term survival, examination of the burden of HIV, and comorbid conditions, on health-related quality of life (HRQOL) has become increasingly important (Sherbourne et al., 2000). UNAIDS (2002) reported that 13 aspects of QoL were poorer in older adults with HIV. Skevington (2012) examined results from eight countries and found across 30 facets of QoL that those aged 40+ had higher QoL and reported eight areas in which they were doing relatively well including positive feelings, safety, home environment, and spirituality, but had poorer energy, sleep, and sex-life. In PLWH, lower HRQOL has been shown to be associated with older age and with lower CD4 counts (Campsmith, Nakashima, & Davidson, 2003). Moreover, physical function decreases more rapidly with age in PLWH compared to uninfected patients (Oursler et al., 2011). While persons with asymptomatic HIV have physical functioning comparable to those without HIV, those with symptomatic HIV report significantly worse physical functioning and those with AIDS report worse physical functioning compared to persons with other types of chronic diseases such as diabetes, prostate cancer, or depression (Hays et al., 2000). Although increased age is associated with reduced physical functioning in both HIV-infected and HIV-negative patients, comorbid conditions appear to mediate this relationship even after controlling for the impact of antiretroviral therapy (ART) and HIV disease stage (Oursler et al., 2006). These findings demonstrate the potentially important role of general medical comorbidity in the physical functioning of PLWH (Oursler et al., 2006) and raise questions about the impact that multiple comorbidities may have on the overall HRQOL of an aging HIV population.

Health-related quality of life has shown to be related to depression and stress in PLWH (Mrus, Goldie, Weinstein, & Tsevat, 2000; Sherbourne et al.,

2000). Independent of other chronic illnesses, depression predicts reduced physical functioning in PLWH (Oursler et al., 2006). Depression is the most common comorbid condition for PLWH, with prevalence rates threefold higher than the general population (Kessler et al., 2008). In a large sample of persons over 50 with HIV approximately 39% exhibited symptoms of major depression (Groves, Golub, Parsons, Brennan, & Karpiak, 2010). In HIV populations, rates of depression do not appear to decline as they do in the general population (Rabkin, 2008) and thus depression becomes increasingly relevant in older HIV-positive populations. There is evidence that the number of HIV symptoms is an independent predictor of screening positive for psychological disorders (Bing et al., 2001). Furthermore, there is evidence that depression and stress are adversely associated with HIV disease progression including decreased CD4 T-lymphocytes, increases in viral load, and greater risk for clinical decline and mortality (Leserman et al., 2007). Older adults who endorsed more psychological symptoms also report more HIV-related life-stressor burden, less support from friends, and reduced access to health care and social services due to AIDS-related stigma (Heckman et al., 2002). Despite the known interaction between HIV, depression, and QoL, there remains a dearth of research examining the intersection of these concepts in older persons with HIV (Krishnan et al., 2002).

In sum, the population of PLWH is growing older and more prone to developing other chronic health conditions. HRQOL is related to disease symptomatology and progression. How chronic disease burden, as defined by the number of chronic medical conditions, relates to QoL challenges of older adults living with HIV is not well understood and has not been examined in a community sample in multiple geographic locations. This study describes the relationship of comorbid chronic health conditions to physical, social, and mental health functioning in a nine-state community sample of older adults living with HIV. Based on prior research it is hypothesized that PLWH 50 years and older will report frequent rates of chronic health problems. Furthermore, we hypothesized that self-reported HRQOL, depression, and stress would be strongly related to the reported number of chronic conditions.

Methods

Design

Data from this cross-sectional, observational study was collected as part of a pre-treatment telephone survey for the PRIME project. The PRIME project is

a randomized controlled trial of a telephone-delivered self-management intervention for HIV-positive persons aged 50 years and older. The Group Health IRB approved all procedures.

Recruitment, eligibility, and sample

Participants were recruited from AIDS Service Organizations (ASOs) in nine states (Wisconsin, Texas, Illinois, Pennsylvania, Michigan, Massachusetts, Arizona, California, and Washington) through posters, flyers, and direct mailings. Interested persons called the study toll-free number and completed a brief screener. Eligible participants were then called to complete a 30-minute baseline telephone survey. Participants were compensated \$30 for completing the survey. Eligible participants were 50 years or older, HIV-positive, prescribed ART medications, reported ART non-adherence in past 30 days, were able to hear on the telephone, passed a brief cognitive screener (Callahan, Unverzagt, Hui, Perkins, & Hendrie, 2002) and were willing to participate in a randomized controlled trial. About 1101 persons were assessed for eligibility. As many as 633 people were excluded from the pool (adherent to medications = 517, under age 50 = 48, not on HIV medications = 46, declined participation = 21, did not pass cognitive screener = 1). This resulted in a final sample of 452 (see "Results" for details on surveyed sample).

Measures

Demographic information

Demographic information included self-reported age, race/ethnicity, educational level, gender, sexual orientation, relationship status, employment/disability status, substance use history, HIV diagnosis duration, CD4, and viral load.

Chronic disease

A modified 21-item chronic illness checklist was administered at baseline to identify persons with comorbid chronic conditions (Belloc, Breslow, & Hochstim, 1971). This checklist has been modified for use in other projects targeting older adults (Balderson et al., 2003; Phelan et al., 2002). This measure includes HANA and non-HIV associated illnesses. We adapted this measure for use with older PLWH by including hepatitis and hemophilia in the list of chronic conditions. Chronic disease burden was defined by the number of chronic medical conditions, excluding HIV diagnosis and depression.

Perceived stress scale

The four-item Perceived Stress Scale (PSS; Cohen & Lichtenstein, 1990) was used to evaluate global stress levels. The PSS yields a total perceived stress score, with higher scores indicating greater stress (range = 4–20).

Quality of life

The Short Form 36, Version 2 (SF-36) was used to evaluate functional status and HRQOL (Ware, Kosinski, & Dewey, 2000). The SF-36 is widely used and has been found to have acceptable psychometric properties across different illness and age populations (McHorney, Ware, Lu, & Sherbourne, 1994). The SF-36 has been utilized in monitoring health outcomes in patients with a variety of illnesses including HIV (Riley et al., 2003; Shahriar, Delate, Hays, & Coons, 2003) as well as a wide range of diseases and chronic conditions commonly reported by HIV-positive patients who are 50 years or older including heart disease, diabetes, chronic pain, (Alonso et al., 2004; Chwastiak & Von Korff, 2003) depression (Chwastiak & Von Korff, 2003), and Hepatitis C (Wiegand et al., 2004). For the purposes of this study, we administered three of the eight SF-36 subscales: physical functioning, social functioning, and mental health. These subscales have been shown to be sensitive to change in prior trials (Berwick et al., 1991; Chwastiak & Von Korff, 2003; Gandek et al., 1998) and tap into constructs we hypothesized were likely to change due to our intervention. We chose to use the general SF-36, rather than an HIV-specific, because it is a general measure of HRQOL that can be used across chronic diseases and because national norms are available (Shahriar et al., 2003). The SF-36 utilizes *t*-scores with higher *t*-scores indicating more positive functioning.

Depression

A modified eight-item version of the patient health questionnaire (PHQ) was used (Kroenke, Spitzer, Williams, & Lowe, 2010; Kroenke et al., 2009). The PHQ measures presence of DSM-IV major depression symptoms and can be scored as a continuous or categorical screening measure for depression. Prior work has shown the removal of the suicide ideation question to be acceptable in large samples of depressed individuals (Corson, Gerrity, & Dobscha, 2004; Kroenke et al., 2009) (range = 0–24).

Table 1. Demographics.

	<i>n</i> (%)
<i>Age</i>	
50–54 years old	265 (59%)
55–59 years old	129 (29%)
60+ years old	58 (12%)
<i>Sex</i>	
Male	327 (72%)
Female	125 (28%)
<i>Ethnicity</i>	
African-American	255 (56%)
White/non-hispanic	173 (38%)
Hispanic/Latino	30 (7%)
Native American	11 (2%)
Asian	2 (0.04%)
<i>Education</i>	
Less than high school	81 (18%)
High school	142 (31%)
Some college/college degree	186 (41%)
Post graduate degree	53 (10%)
<i>Sexual orientation</i>	
Heterosexual	248 (55%)
Homosexual	157 (35%)
Bisexual	39 (9%)
Transgender or transsexual	4 (1%)
Refused/don't know	4 (1%)
<i>Relationship</i>	
Single	213 (47%)
Married/partnered	107 (24%)
Divorced/separated	95 (21%)
Widowed	37 (8%)
Ever injected drugs	160 (35%)
Undetectable viral load	298 (66%)
Ever been diagnosed with AIDS	242 (54%)
<i>HIV duration</i>	
Less than 5 years	32 (7%)
5–9 years	60 (13%)
10–14 years	117 (26%)
15–19 years	120 (27%)
20+ years	121 (27%)
Self-reported depression in last 3 years	242 (64%)
Most recent CD4, Mean (SD)	514 (329)

Results

Table 1 describes the demographics, rates of injection drug use, and viral load in the study population. The sample is primarily heterosexual African-American men. The mean age was 55.8 years ($SD = 4.3$, range 50–75) and approximately 82% of the sample attained at least a high school diploma.

Figure 1 presents the percentages of people reporting the number of chronic health conditions other than HIV (also excluding depression). The number of chronic conditions reported was high, the modal number of chronic illness in addition to HIV was 2 (mean = 3.8, $SD = 2.6$), with a reported

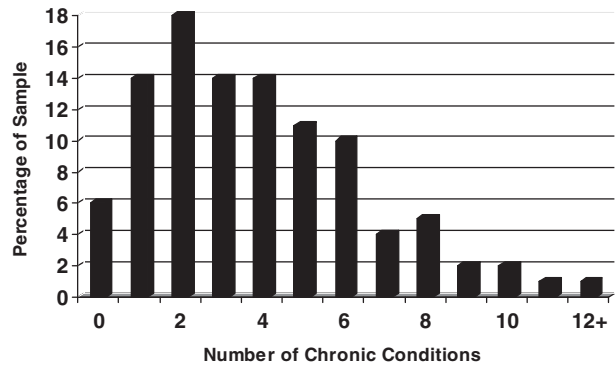


Figure 1. Number of self-reported chronic conditions in addition to HIV, excluding depression.

range of 0–15 chronic conditions. The top chronic illnesses were high blood pressure (46%), chronic pain other than back pain and headache (45%), hepatitis (39%), and arthritis (35%), and chronic back pain (33%), asthma (32%), and diabetes (21%) (Figure 2).

Self-reported functioning as assessed by the SF-36 demonstrated relatively high functioning for the sample, with better social functioning (mean = 66.0, $SD = 28.7$), followed by mental health functioning (mean = 60.0, $SD = 16.5$), and physical functioning (mean = 58.2, $SD = 26.3$). Mean depression scores are considered in the mild range with a mean of 7.3 ($SD = 5.7$). Utilizing the scoring criteria for diagnostic screening, 14% ($n = 63$) of the sample reported symptoms consistent with Major Depression according to DSM-IV criteria. Perceived stress scores indicate a moderate level of reported stress for the sample ($M = 9.7$, $SD = 3.4$).

Physical, social, and mental health functioning, stress, and depression were all strongly associated with the number of chronic conditions (Table 2). Unadjusted and adjusted regression models were conducted. For the adjusted model, we used a least-squares regression analysis controlling for age group (under 55, 55–59, 60+), gender, racial group (white vs. African-American vs. other), and education level (high school graduate or less vs. some college or higher) and self-reported most recent CD4. The SF-36 *t*-scores declined as the number of chronic conditions increased, decreasing by 4.8 points for physical functioning, 3.7 for social functioning, and 2.1 units for mental health functioning per additional chronic illness. Depression symptom severity increased as the number of chronic conditions increased by an estimated 0.9 units per additional condition. Perceived stress increased as the number of chronic conditions increased by an average of 0.4 units.

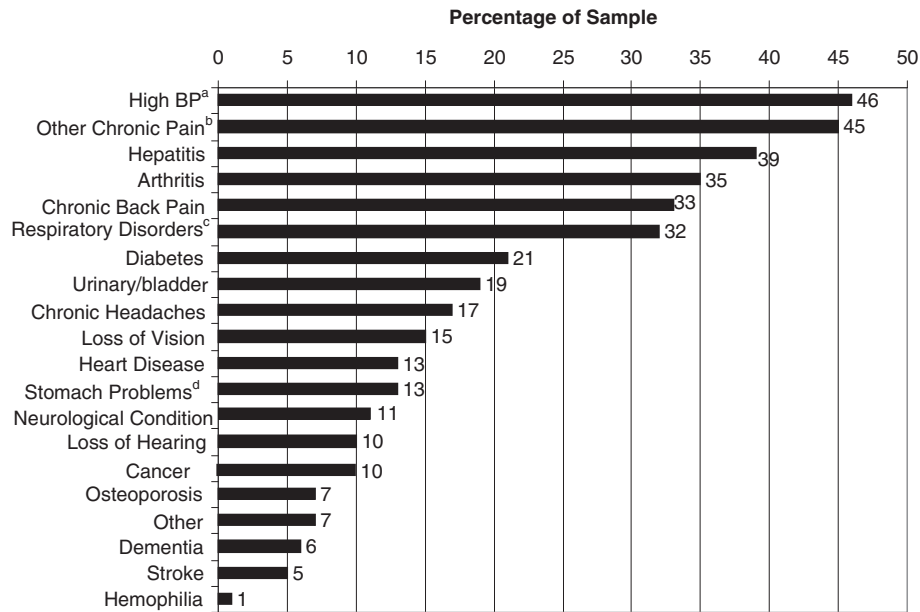


Figure 2. Type of self-reported chronic conditions.

Note: ^aBP, blood pressure.

^b“Other Chronic Pain” refers to chronic pain other than arthritis, back pain, or headaches.

^c“Respiratory Disorders” refers to asthma, chronic bronchitis, and emphysema.

^d“Stomach Problems” refers to ulcers, chronic acid reflux, chronic inflamed bowel, enteritis, or colitis.

Discussion

Results from this study underscore the importance of examining the overall health of older individuals with HIV. Compared to the general population of person's 50 years and older in the US our sample had more chronic health conditions. For example in a US sample taken in 2005, 79.7% of person's 50+ had a chronic illness, while in our sample in addition to HIV 94% of our sample reported a chronic illness (American Association of Retired People [AARP], 2009). Prior research has indicated that person's age 50 years and older with HIV are at greater risk of certain types of illnesses (Brown & Qaqish, 2006;

Desquilbet et al., 2007; Fauci et al., 2010). In HIV-positive populations, a comorbid chronic illness is often reported in isolation from other conditions rather than examining the multiple chronic conditions that co-occur. In our sample of person's 50 years and older with HIV, 94% reported at least one additional illness, with an average of two additional chronic health problems, three conditions when depression was included. These results are similar to Karpiak and colleagues (Brennan et al., 2009) findings ($M = 3$ conditions) in a large sample of HIV-positive persons aged 50 plus, living in New York City in which depression was also included in the chronic condition

Table 2. Relationship between quality of life variables and number of chronic conditions.

	M (SD)	Unadjusted		Adjusted	
		Beta	<i>p</i>	Beta	<i>p</i>
SF physical functioning ^a	58.2 (26.3)	-5.01	<0.0001	-4.78	<0.0001
SF social functioning ^a	66.0 (28.7)	-3.77	<0.0001	-3.71	<0.0001
SF mental health functioning ^a	60.0 (16.5)	-2.25	<0.0001	-2.13	<0.0001
Depression ^b	7.3 (5.7)	0.9	<0.0001	0.89	<0.0001
Perceived stress ^c	9.6 (3.44)	0.39	<0.0001	0.36	<0.0001

Note: “Beta” gives the average change per additional chronic condition.

^aRange 0 (worst) to 100 (best).

^bRange 0 (no symptoms) to 24 (severe symptoms).

^cRange 4 (low) to 24 (high).

Adjusted for age group (under 55, 55–59, 60 +), gender, racial group (white vs. African-American vs. other), and education level (high school graduate or less vs. some college or more education) and self-reported last CD4 value using least-squares regression analysis.

tally. Vance, Mugavero, Willig, Raper, and Saag (2011) also reported that those HIV-positive over the age of 50 averaged four additional chronic conditions, significantly higher than their younger counterparts. However, our rates of chronic conditions are lower than what was demonstrated in a large sample of HIV-positive veterans which showed approximately half to two-thirds of those over the age of 50 had an additional physical health comorbidity (Goulet et al., 2007). Our sample extends the literature by examining a community sample of persons in multiple cities across the US. Hypertension, chronic pain, hepatitis, arthritis, respiratory conditions, and diabetes were the most common chronic conditions reported by older adults participating in our study.

For purposes of this study's analysis we focused on physical health problems, thus removing mental health problems such as depression. However, depression should not be overlooked as important clinical variable for this population. In our sample, we found 64% reporting an episode of depression in the last 3 years. When the PHQ-8 scores are examined for current depressive symptomatology, the sample overall reports a mild level of depression. However, 14% of the sample indicates clinically significant depression at time of assessment. This is considered a higher rate than one would expect in the general population, which has previously been reported by the CDC to be 4–7% in an adult population sample using the PHQ-9 (Pratt & Brody, 2008) and a 50+ HIV-positive sample of veterans rates were 6–11%. Our finding reiterates prior findings (Rabkin, 2008) that unlike other illness populations, older adults with HIV do not have a decrease in depression with age but have an increase or ongoing maintenance of depressive symptoms with older age.

Despite relatively high rates of depression, overall QoL was moderately high for the sample. Also, mental health was not the major QoL variable that was influenced by the presence of additional chronic illnesses. When we looked at QoL variables, it was physical functioning that was most impacted by the addition of other chronic health problems, followed by social functioning and finally mental health functioning. Results demonstrated a moderate level of overall stress for the sample which significantly increased with addition of other chronic health problems.

Findings from the current study indicate that for persons 50 years and older with HIV, additional chronic health problems are the norm. This raises a challenge for patient-centered care with HIV-positive older adults. Historically, HIV care has often been portioned off by specialists, adept in HIV care and treating potential opportunistic infections. However,

less attention was needed for other chronic health conditions often associated with age. As increasing numbers of HIV-positive people reach older age, healthcare must consider how it will address the needs of this population. Caring for older individuals with HIV must take into account the whole person, proceed with a more comprehensive consideration of health and be poised to address both the specific health concerns of HIV but also the high likelihood of other chronic health conditions. This challenge extends beyond HIV and other physical illnesses to mental health diagnoses as witnessed by higher rates of reported depressive symptoms.

Acknowledgements

This project was made possible by the funding of the NIH via the NIMH grant R01-MH074380. We would like to acknowledge the contributions of our ASO partners as well as our PRIME team members: Megan Addis, June Blue-Spruce, Ameer Morrow, and Mary Shea. We thank all our participants without whom none of this would be possible.

References

- Alonso, J., Ferrer, M., Gandek, B., Ware, J.E. Jr., Aaronson, N.K., & Mosconi, P. (2004). Health-related quality of life associated with chronic conditions in eight countries: Results from the International Quality of Life Assessment (IQOLA) Project. *Quality of Life Research, 13*(2), 283–298. doi: 10.1023/B:QURE.0000018472.46236.05
- American Association of Retired People (AARP). (2009). *Beyond 50.09 chronic care: A call to action for health reform*. Retrieved from http://assets.aarp.org/rgcenter/health/beyond_50_hcr.pdf
- Appay, V., & Sauce, D. (2008). Immune activation and inflammation in HIV-1 infection: Causes and consequences. *Journal of Pathology, 214*(2), 231–241. doi: 10.1002/path.2276
- Balderson, B., Phelan, E.A., Sandhu, N., LoGerfo, J.P., Levine, M., & Wagner, E.H. (2003). *Exercise, self-efficacy for exercise, self-perceived health and healthcare utilization*. Paper presented at the Annual Meeting of the American Geriatrics Society, Baltimore, MD.
- Belloch, L.B., Breslow, L., & Hochstim, J.R. (1971). Measurement of physical health in a general population survey. *American Journal of Epidemiology, 93*(5), 328–336. Retrieved from <http://aje.oxfordjournals.org/>
- Berwick, D.M., Murphy, J.M., Goldman, P.A., Ware, J.E.J., Barsky, A.J., & Weinstein, M.C. (1991). Performance of a five-item mental health screening test. *Medical Care, 29*(2), 169–176. Retrieved from <http://journals.lww.com/lww-medicalcare/pages/default.aspx>
- Bing, E.G., Burnam, M.A., Longshore, D., Fleishman, J.A., Sherbourne, C.D., & London, A.S. (2001). Psychiatric disorders and drug use among human

- immunodeficiency virus-infected adults in the United States. *Archives of General Psychiatry*, 58(8), 721–728. doi: 10.1001/archpsyc.58.8.721
- Brennan, M., Karpiak, S.E., Shippy, R.A., & Cantor, M.H. (2009). *Older adults with HIV: An in-depth examination of an emerging population*. New York: Nova Science.
- Brown, T.T., & Qaqish, R.B. (2006). Antiretroviral therapy and the prevalence of osteopenia and osteoporosis: A meta-analytic review. *AIDS*, 20(17), 2165–2174. doi: 10.1097/QAD.0b013e32801022eb
- Callahan, C.M., Unverzagt, F.W., Hui, S.L., Perkins, A.J., & Hendrie, H.C. (2002). Six-item screener to identify cognitive impairment among potential subjects for clinical research. *Medical Care*, 40(9), 771–781. Retrieved from <http://journals.lww.com/lww-medical-care/pages/default.aspx>
- Campsmith, M.L., Nakashima, A.K., & Davidson, A.J. (2003). Self-reported health-related quality of life in persons with HIV infection: Results from a multi-site interview project. *Health and Quality of Life Outcomes*, 1, 12. doi: 10.1186/1477-7525-1-12
- Center for Disease Control and Prevention (CDC). (2008). HIV prevalence estimates – United States, 2006. *MMWR. Morbidity and Mortality Weekly Report*, 57(39), 1073–1076. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5739a2.htm>
- Centers for Disease Control and Prevention (CDC). (1998). AIDS among persons aged > or = 50 years – United States, 1991–1996. *MMWR. Morbidity and Mortality Weekly Report*, 47(2), 21–27. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/00050856.htm>
- Chwastiak, L.A., & Von Korff, M. (2003). Disability in depression and back pain: Evaluation of the World Health Organization Disability Assessment Schedule (WHO DAS II) in a primary care setting. *Journal of Clinical Epidemiology*, 56(6), 507–514. doi: 10.1016/S0895-4356(03)00051-9
- Cohen, S., & Lichtenstein, E. (1990). Perceived stress, quitting smoking, and smoking relapse. *Health Psychology*, 9(4), 466–478. doi: 10.1037/0278-6133.9.4.466
- Corson, K., Gerrity, M.S., & Dobscha, S.K. (2004). Screening for depression and suicidality in a VA primary care setting: 2 Items are better than 1 item. *The American Journal of Managed Care*, 10(11 Pt 2), 839–845. Retrieved from <http://www.ajmc.com/>
- Desquilbet, L., Jacobson, L.P., Fried, L.P., Phair, J.P., Jamieson, B.D., & Holloway, M. (2007). HIV-1 infection is associated with an earlier occurrence of a phenotype related to frailty. *The Journals of Gerontology. Series A, Biological Sciences and Medical Science*, 62(11), 1279–1286. Retrieved from <http://biomedgerontology.oxfordjournals.org/>
- Eggers, P.W., & Kimmel, P.L. (2004). Is there an epidemic of HIV infection in the US ESRD program? *Journal of the American Society of Nephrology*, 15(9), 2477–2485. doi: 10.1097/01.ASN.0000138546.53152.A7
- Fauci, A.S., Hodes, R.J., & Whitescarver, J. (2010, September 18). *NIH statement on National HIV/AIDS and Aging Awareness Day*. Retrieved from <http://www.nih.gov/news/health/sep2010/niaid-09.htm>
- Gandek, B., Ware, J.E. Jr., Aaronson, N.K., Alonso, J., Apolone, G., & Bjorner, J. (1998). Tests of data quality, scaling assumptions, and reliability of the SF-36 in eleven countries: Results from the IQOLA Project. International Quality of Life Assessment. *Journal of Clinical Epidemiology*, 51(11), 1149–1158. doi: 10.1016/S0895-4356(98)00106-1
- Girardi, E., Aloisi, M.S., Arici, C., Pezzotti, P., Serraino, D., & Balzano, R. (2004). Delayed presentation and late testing for HIV: Demographic and behavioral risk factors in a multicenter study in Italy. *Journal of Acquired Immune Deficiency Syndromes*, 36(4), 951–959. Retrieved from <http://journals.lww.com/jaids/pages/default.aspx>
- Goulet, J.L., Fultz, S.L., Rimland, D., Butt, A., Gibert, C., & Rodriguez-Barradas, M. (2007). Aging and infectious diseases: Do patterns of comorbidity vary by HIV status, age, and HIV severity? *Clinical Infectious Diseases*, 45(12), 1593–1601. doi: 10.1086/523577
- Grov, C., Golub, S.A., Parsons, J.T., Brennan, M., & Karpiak, S.E. (2010). Loneliness and HIV-related stigma explain depression among older HIV-positive adults. *AIDS Care*, 22(5), 630–639. doi: 10.1080/09540120903280901
- Guaraldi, G., Orlando, G., Zona, S., Menozzi, M., Carli, F., & Garlassi, E. (2011). Premature age-related comorbidities among HIV-infected persons compared with the general population. *Clinical Infectious Disease*, 53(11), 1120–1126. doi: 10.1093/cid/cir627
- Hays, R.D., Cunningham, W.E., Sherbourne, C.D., Wilson, I.B., Wu, A.W., & Cleary, P.D. (2000). Health-related quality of life in patients with human immunodeficiency virus infection in the United States: Results from the HIV cost and services utilization study. *The American Journal of Medicine*, 108(9), 714–722. doi: 10.1016/S0002-9343(00)00387-9
- Heckman, T.G., Heckman, B.D., Kochman, A., Sikkema, K.J., Suhr, J., & Goodkin, K. (2002). Psychological symptoms among persons 50 years of age and older living with HIV disease. *Aging and Mental Health*, 6(2), 121–128. doi: 10.1080/13607860220126709a
- Justice, A.C., & Weissman, S. (1998). The survival experience of older and younger with AIDS. *Research on Aging*, 20(6), 665–685. doi: 10.1177/0164027598206003
- Kessler, R.C., Gruber, M., Hettema, J.M., Hwang, I., Sampson, N., & Yonkers, K.A. (2008). Co-morbid major depression and generalized anxiety disorders in the National Comorbidity Survey follow-up. *Psychological Medicine*, 38(3), 365–374. doi: 10.1017/S0033291707002012
- Krishnan, K.R., Delong, M., Kraemer, H., Carney, R., Spiegel, D., & Gordon, C. (2002). Comorbidity of depression with other medical diseases in the elderly. *Biological Psychiatry*, 52(6), 559–588. doi: 10.1016/S0006-3223(02)01472-5
- Kroenke, K., Spitzer, R.L., Williams, J.B., & Lowe, B. (2010). The patient health questionnaire somatic, anxiety, and depressive symptom scales: A systematic

- review. *General Hospital Psychiatry*, 32(4), 345–359. doi: 10.1016/j.genhosppsy.2010.03.006
- Kroenke, K., Strine, T.W., Spitzer, R.L., Williams, J.B., Berry, J.T., & Mokdad, A.H. (2009). The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*, 114(1–3), 163–173. doi: 10.1016/j.jad.2008.06.026
- Leserman, J., Pence, B.W., Whetten, K., Mugavero, M.J., Thielman, N.M., & Swartz, M.S. (2007). Relation of lifetime trauma and depressive symptoms to mortality in HIV. *The American Journal of Psychiatry*, 164(11), 1707–1713. doi: 10.1176/appi.ajp.2007.06111775
- Levy, J.A. (1998). HIV/AIDS and injecting drug use in later life. *Research on Aging*, 20(6), 776–797. doi: 10.1177/0164027598206008
- Mack, K.A., & Ory, M.G. (2003). AIDS and older Americans at the end of the twentieth century. *Journal of Acquired Immune Deficiency Syndromes*, 33(Suppl. 2), S68–S75. Retrieved from <http://journals.lww.com/jaids/pages/default.aspx>
- Martin, C.P., Fain, M.J., & Klotz, S.A. (2008). The older HIV-positive adult: A critical review of the medical literature. *The American Journal of Medicine*, 121(12), 1032–1037. doi: 10.1016/j.amjmed.2008.08.009
- McHorney, C.A., Ware, J.E. Jr., Lu, J.F., & Sherbourne, C.D. (1994). The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Medical Care*, 32(1), 40–66. Retrieved from <http://journals.lww.com/lww-medicalcare/pages/default.aspx>
- Mrus, J.M., Goldie, S.J., Weinstein, M.C., & Tsevat, J. (2000). The cost-effectiveness of elective Cesarean delivery for HIV-infected women with detectable HIV RNA during pregnancy. *AIDS*, 14(16), 2543–2552. Retrieved from <http://journals.lww.com/aidsonline/pages/default.aspx>
- Oursler, K.K., Goulet, J.L., Crystal, S., Justice, A.C., Crothers, K., & Butt, A.A. (2011). Association of age and comorbidity with physical function in HIV-infected and uninfected patients: Results from the Veterans Aging Cohort Study. *AIDS Patient Care and STDs*, 25(1), 13–20. doi: 10.1089/apc.2010.0242
- Oursler, K.K., Goulet, J.L., Leaf, D.A., Akingicil, A., Katzel, L.I., & Justice, A. (2006). Association of comorbidity with physical disability in older HIV-infected adults. *AIDS Patient Care and STDs*, 20(11), 782–791. doi: 10.1089/apc.2006.20.782
- Phelan, E.A., Williams, B., Leveille, S., Snyder, S., Wagner, E.H., & LoGerfo, J.P. (2002). Outcomes of a community-based dissemination of the health enhancement program. *Journal of American Geriatric Society*, 50(9), 1519–1524. doi: 10.1046/j.1532-5415.2002.50407.x
- Pratt, L.A., & Brody, D.J. (2008). Depression in the United States household population, 2005–2006. *National Center for Health Statistics Data Brief*, 7, 1–8. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db07.pdf>
- Rabkin, J.G. (2008). HIV and depression: 2008 review and update. *Current HIV/AIDS Reports*, 5(4), 163–171. doi: 10.1007/s11904-008-0025-1
- Riley, E.D., Bangsberg, D.R., Perry, S., Clark, R.A., Moss, A.R., & Wu, A.W. (2003). Reliability and validity of the SF-36 in HIV-infected homeless and marginally housed individuals. *Quality of Life Research*, 12(8), 1051–1058. doi: 10.1023/A:1026166021386
- Shahriar, J., Delate, T., Hays, R.D., & Coons, S.J. (2003). Commentary on using the SF-36 or MOS-HIV in studies of persons with HIV disease. *Health and Quality of Life Outcomes*, 1, 25. doi: 10.1186/1477-75251-25
- Sherbourne, C.D., Hays, R.D., Fleishman, J.A., Vitiello, B., Magruder, K.M., & Bing, E.G. (2000). Impact of psychiatric conditions on health-related quality of life in persons with HIV infection. *The American Journal of Psychiatry*, 157(2), 248–254. doi: 10.1176/appi.ajp.157.2.248
- Skevington, S.M. (2012). Is quality of life poorer for older adults with HIV/AIDS? International evidence using the WHOQOL-HIV. *AIDS Care*, 24(10), 1219–1225. doi: 10.1080/09540121.2012.661838
- Skiest, D.J. (2003). The importance of co-morbidity in older HIV-infected patients. *AIDS*, 17(10), 1577. doi: 10.1097/00002030-200307040-00025
- Smith, G.H. (2005, May 12). *HIV over fifty: Exploring the new threat retrieved senate hearing*, pp. 109–147. Retrieved from http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_senate_hearings&docid=f:23758.pdf
- Stall, R., & Catania, J. (1994). AIDS risk behaviors among late middle-aged and elderly Americans. The National AIDS Behavioral Surveys. *Archives of Internal Medicine*, 154(1), 57–63. Retrieved from <http://archinte.ama-assn.org/>
- UNAIDS. (2002). Impact of AIDS on older populations: Fact sheet. Retrieved from http://data.unaids.org/publications/Fact-Sheets02/fs_older_en.pdf
- Vance, D.E., Mugavero, M., Willig, J., Raper, J.L., & Saag, M.S. (2011). Aging with HIV: A cross-sectional study of comorbidity prevalence and clinical characteristics across decades of life. *The Journal of the Association of Nurses in AIDS Care*, 22(1), 17–25. doi: 10.1016/j.jana.2010.04.002
- Ware, J.E., Kosinski, M., & Dewey, J.E. (2000). *How to score version 2 of the SF-36 health survey*. Lincoln, RI: QualityMetric.
- Wiegand, J., Jackel, E., Cornberg, M., Hinrichsen, H., Dietrich, M., & Kroeger, J. (2004). Long-term follow-up after successful interferon therapy of acute hepatitis C. *Hepatology*, 40(1), 98–107. doi: 10.1002/hep.20291