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Perceived burden in adherence of antiretroviral treatment in rural China

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Abstract

To determine the level of antiretroviral treatment adherence and explore the correlated factors of perceived burden of taking antiretroviral medications among people living with HIV (PLH) in a rural area of China. Data were collected from 66 PLH who were currently receiving antiretroviral treatment. Face-to-face interviews were conducted during August to October, 2009.

Approximately 18.2% of participants failed to adhere to antiretroviral treatment in the previous 30 days. A majority of PLH reported that taking antiretroviral medications posed a burden to them.

Those who perceived a higher level of burden were more likely to be women, to have lower annual income, and to report a high level of depressive symptoms, poor physical health, and strained family interactions. Findings suggest that future programs in promoting adherence to antiretroviral treatment should address issues related to psychosocial well-being and PLH's interactions with their family members.

Keywords

HIV; antiretroviral treatment; burden; medication adherence; China

Introduction

Antiretroviral treatment (ART) has transformed HIV infection into a manageable chronic disease. However, successful treatment is contingent on a high level of adherence to ART. As demonstrated by Paterson et al. (2000), ART adherence above 95% is necessary to optimize positive virologic and clinical outcomes. For people living with HIV (PLH), ART adherence is a difficult and challenging lifelong process (Liu et al., 2001; Singh et al., 1999). For example, a pooled analysis of North American studies reported adherence of only 55% while for African studies adherence was better at 77% (Mills et al., 2006). Poor adherence to ART increases the development of resistant viral strains, resulting in virologic failure and leading to poorer clinical outcomes and an increased risk of death (Sethi, Celentano, Gange, Moore, & Gallant, 2003).

In China, a pilot ART program offering free services was initiated in 2002. The program was scaled up rapidly, progressing from an emergency response to a standardized treatment and care system (Wu, Sullivan, Wang, Rotheram-Borus, & Detels, 2007; Zhang, Pan, Yu, Wen, & Zhao, 2005). By August 2008, more than 50,000 patients in several autonomous

regions and municipalities had received free first-line, highly active ART (Ma et al., 2009; Zhang et al., 2007, 2009), which is distributed to patients on a bi-weekly or monthly basis at village clinics. Village doctors became responsible for monitoring the treatment efficacy and side effects, all the while facilitating adherence (Wang & Wu, 2007). A study of 181 patients treated with free ART in China found that 81.8% of patients reported 95% or greater adherence in the previous three days (Wang & Wu, 2007). Another study found that 20% of patients reported taking 90% or less of their prescribed doses in the last week (Wang et al., 2008).

Previous studies have found a myriad of predictors of poor adherence to HIV antiretroviral medication, including patient's knowledge, complex treatment regimens, pill burden, poor doctor-patient relationships, a high level of depression, severe side-effects, and minimal family and social support (Simoni, Frick, Pantalone, & Turner, 2003). The perceived burden of taking medicine reflects a level of difficulty for many patients, which may impact patients' adherence to ART. Therefore, we hypothesized that the predictors of adherence to ART should be associated with patients' perceived burden of taking medicine. Understanding these relationships will help elucidate the reasons for nonadherence and also provide a new way to identify barriers to ART adherence, especially when an accurate measurement of adherence is difficult. No previous studies have formally examined these relationships. The purpose of this article is to determine the level of ART adherence among PLH in a rural area of China as well as to explore the correlated factors of perceived medication burden.

Methods

Sample and data collection

This study uses baseline data from an intervention pilot study. The pilot study was conducted in three counties of Anhui province, China, where the majority of HIV infections were transmitted through blood plasma donations (Ji, Detels, Wu, & Yin, 2006). In the early 1990s, thousands of commercial plasma collection stations were established in rural areas of China, including government and privately operated stations. Donors were paid for their plasma, which prompted frequent donations. However, many plasma stations failed to collect plasma according to standard health protocols, which led to large-scale HIV infection among former donors (Ji, Detels, Wu, & Yin, 2006; Wu, Rou, & Detels, 2001). All procedures and forms were reviewed and approved by the Institutional Review Boards of the University of California, Los Angeles, the Anhui Province Center for Disease Prevention and Control, and Anhui Medical University.

Potential participants were at least 18 years old, had a confirmed AIDS diagnosis or HIV-positive status, and having a sero-negative family member at home, and the family member who was aware of the HIV status of PLH and willing to participate in the study. With the assistance of village health workers, project recruiters approached potential participants by following standardized scripts to ensure all ethical issues were explained and the consent process was secure. Following informed consent, face-to-face interviews were conducted either at a family's home or at another preferred venue such as a village clinic. Each interview lasted 45–60 minutes. PLH participants were paid 50 yuan (US \$8) for each assessment.

Measures

Antiretroviral treatment adherence was assessed only for PLH who were currently on ART. Participants were asked to recall the medication taken during the 30 days prior to the interview. For the current analysis, we calculated medication adherence based on any missed

pills (<100% adherent) versus no pills missed in the previous 30 days (100% adherent). The variable “missed ARV (antiretroviral) medications in the previous 30 days” (1: <100% adherent; 0: 100% adherent) was selected as an outcome of interest.

Depressive symptoms were measured using the short version of the Zung Self-Rating Depression Scale (Zung, 1965). This is a 9-item instrument adapted from the original 20-item questionnaire. Participants were asked how often they felt each of 9 situations, including “I get tired for no reason” and “I have trouble sleeping at night.” Response categories ranged from “a little of the time” (1) to “most of the time” (4). The overall scale was the sum of the individual items. Some items were reverse-coded so that scores were in the same direction for all the items, with a higher score indicated a higher level of depressive symptoms. Cronbach’s alpha for this scale was 0.76.

Positive family interaction was measured by an adapted version of the Family Functioning Scale (Bloom, 1985; Bloom & Naar, 1994). The original scale is a 75-item survey consisting of 15 topics reflecting family relationship, system maintenance, and personal growth dimensions. For this study, three sub-scales – family cohesion, family conflict, and family sociability – were chosen based on study interests and cultural appropriateness. Each of the sub-scales consisted of five items; a total of 15 statements were used. The overall scale was the sum of all 15 items. Some items were reverse-coded so that a higher score indicated better family interaction. Cronbach’s alpha value for the overall scale was 0.82.

Quality of life was measured by the Medical Outcomes Study-HIV Health Survey (MOS-HIV). This scale is a widely accepted measure for quality of life with HIV populations (Ichikawa & Natpratan, 2004; Wu, Revicki, Jacobson, & Malitz, 1997). The instrument has 35 items that assess 11 dimensions of health in PLH (general health, physical functioning, role functioning, social functioning, cognitive functioning, pain, mental health, energy/fatigue, health distress, quality of life, and health transition). The overall scale was the sum of all 35 items. Some items were reverse-coded so that higher scores indicated better quality of life. Cronbach’s alpha value for the overall scale was 0.92.

We also included variables on respondents’ demographic information (age, gender, education, marital status, length of time since HIV diagnosis, frequency reminded by family members and friends, ways to remind of taking ARV medications, and perceived burden of taking ARV medications).

Statistical analysis

All statistical analyses were performed using the SAS 9.2 statistical software package (SAS Institute Inc., Cary, NC, USA). First, descriptive statistics were used to describe the demographics and ART-related variables. Second, differences in demographics and perceived burden of taking ARV medications and other variables between nonadherent and adherent patients were examined using *t*-tests for continuous variables and Pearson chi-squares or Fisher’s exact test for categorical variables. Third, relations between perceived burden of taking ARV medications and other variables were examined using ANOVA for continuous variables and Pearson chi-squares or Fisher’s exact test for categorical variables.

Results

Sample characteristics

The analytic sample included only participants who were on ART because the primary outcome was ART adherence. Of the 88 participants in the study, 66 were on ART at baseline and are included in the analysis.

The descriptive characteristics of the 66 participants on ART are summarized in Table 1. About 60% of the participants were men. The average age was about 41. Approximately 90% of participants were married or living as married and over 72.6% reported having an education of primary school or below. About 51.5% reported having an individual income of 2000 yuan (US \$310) or less per year. About 43% of participants were diagnosed with HIV within 3 years prior to the survey. Almost 44% ($n=30$) of the sample reported “yes” to the question, “Have you ever forgotten to take ARV medications in your lifetime?” Among the 30 PLH who reported failing to adhere to ART since the initiation of ART, 43.3% ($n=13$) reported failing to adhere to ART in the previous 30 days. About 70% of PLH reported that taking ARV medications posed a burden to them. Half of the sample reported that their family members and friends usually or always reminded them to take the medication. Forgetfulness was the only reason mentioned by PLH for the failure to adhere to ART in the previous 30 days (29%) (data not shown).

Nonadherent and adherent patients

Sociodemographic- and ART-related characteristics of nonadherent and adherent patients are shown in Table 2. Nonadherent patients reported that their family members and friends sometimes or always reminded them to take medicine, which was higher than adherent patients (76%). With respect to medication burden, 73.6% of adherent patients reported that taking medicine posed a burden, which was higher than nonadherent patients (61.5%), but the difference was not significant ($p=0.150$). In addition, no significant differences in demographic variables between the adherent and nonadherent patients were found.

Relationship between medication burden and other variables

As shown in Table 3, patients who perceived a higher level of burden were more likely to be women ($p=0.2741$), to have a lower income ($p=0.0408$), to have poor quality of life ($p=0.0086$) and family interaction ($p=0.0826$), and to have a higher level of depressive symptoms ($p=0.0008$).

Discussion

We observed an adherence rate of 81.8% in the previous 30 days among participants in our study, which is consistent with findings in a previous study conducted in China (Wang & Wu, 2007). However, approximately 44% of study participants reported that they had ever missed medications since the initiation of antiretroviral treatment, suggesting that adherence to ART for the long-term was still a big challenge.

Family members can act as a reminder and encourage PLH to participate in interventions and take medications on a regular basis. In our sample, we found about 93% of PLH participants reported that their family members and friends sometimes or frequently reminded them to take medicine. Results from a qualitative study conducted among HIV-infected women reported that family reminders could help them to adhere to their medication schedule (Abel & Painter, 2003). The important role of family members in assisting in ART adherence has also been documented in other studies (Knodel, Kespichayawattana, Saengtienchai, & Wiwatwanich, 2010; Kumarasamy et al., 2005). This finding suggests that family members should be included in future ART adherence programs.

In this study, we did not find a significant association between adherence to ART and demographic characteristics, which is consistent with several previous studies (Caulbeck et al., 2009; Singh et al., 1999; Wang & Wu, 2007) but not with others (Carballo et al., 2004; Turner, Laine, Cosler, & Hauck, 2003). In this study, inception of HIV diagnosis was not

associated with adherence to ART. This might be due to our small sample size. Also, participants in this study were recruited from a rural area of China, where almost 90% of infections were through paid plasma donation in the 1990s (Wu, Sullivan, Wang, Rotheram-Borus, & Detels, 2007). In our sample, we found that most participants were married, middle-aged, with lower education and lower income, suggesting that there was not great heterogeneity in demographic characteristics or years since HIV infection.

Contrary to expectations, we found that a higher percentage of adherent patients than nonadherent patients reported that taking ARV medications posed a burden to them. Possible explanations include the small sample size and the small number of nonadherent patients in the sample, which may have reduced the reliability of the association. Furthermore, we used a cross-sectional survey, which makes it possible that patients' perceived medication burden might predict future nonadherence but be affected by their past adherence. Also, it is possible that those patients who can successfully adhere to ART are those who acknowledge the responsibility of taking the medication, and therefore have effective ways to deal with the perceived burden.

More importantly, this study measured patients' perceived burden of taking ARV medications and its associations with quality of life and other psychosocial factors. We found PLH with a lower level of perceived burden in taking medication reported better quality of life and a lower level of depressive symptoms. Numerous studies have examined the association between quality of life and adherence to ART and found that adherence can contribute to improved HIV clinical outcomes, which would result in a improved quality of life; quality of life could influence adherence because a person with a good quality of life may enhance their ability to adhere to their ART regimens (Holzemer et al., 1999; Mannheimer et al., 2005). Also, a higher level of depression was identified as a predictor of nonadherence to ART in previous studies (Campos, Guimarães, & Remien, 2010; Li et al., 2010; Singh et al., 1996; Starace et al., 2002). Our findings imply that better quality of life and a lower level of depressive symptoms may influence patients' adherence to ART through an associated decrease in burden of taking medications. However, this causality could not be determined in this study due to the cross-sectional design.

We also found PLH with a lower level of perceived burden of taking medication reported better family interactions. Although this association was not statistically significant, health providers should pay attention to family interaction among patients receiving ART, as family communication can be a significant contributor to ART adherence (Li et al., 2010). Our insignificant association in this study could be partially explained by a lack of statistical power due to the small sample. Family members could provide reminders for daily treatment, as our findings suggest, and they could also provide support to overcome side-effects and provide assistance with a wide variety of daily living activities. This is especially important in China, where family is the most important contextual influence in the lives of PLH (Li et al., 2006).

Our study has several limitations. First, we conducted data analyses based on cross-sectional data; therefore, causal interpretations of the results cannot be established. Second, this was a study with a small sample size and thus limited ability to detect small, significant differences between the nonadherent and adherent patients. Finally, the level of adherence might be overestimated because ART adherence was measured based on self-reports that could be affected by social desirability or recall bias.

Despite these limitations, this study – the first to assess patients' perceived burden in taking medicine in China – indicates that future research should employ strategies to improve family interactions between PLH and their family members and to strengthen the role of

family members in reminding PLH to take their medication. Additional studies are needed to further investigate the relationships between treatment adherence and patients' perceived burden as well as strategies used to deal with the burden.

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Table 1Characteristics of the study sample (PLH on ART) ($n=66$).

Characteristics	<i>N</i>	%
Age (years), mean±SD	41.0±6.8	
30–35	14	21.2
36–40	20	30.3
41–45	19	28.8
46–60	19	19.7
Male	40	60.6
<i>Married</i>	59	89.4
Annual income (yuan), mean±SD	2871.2±2733.4	
2000 or less	34	51.5
2001–5000	25	37.9
5001 or more	7	10.6
Education (years), mean±SD	4.5±2.8	
No schooling	9	13.6
Primary school	39	59.1
Junior high or higher	18	27.3
Years since HIV diagnosis, mean±SD	4.0±2.4	
3 or less	25	37.9
3–4	26	39.4
5 or more	15	22.7
Missed ARV medications since initiation of ART	29	43.9
Missed ARV medications in previous 30 days	13	19.7
Reminded by family members and friends		
Never	4	6.4
Sometimes	26	41.3
Usually/always	33	52.3
Burden of taking ARV medications		
Big	16	24.2
Some	31	47.0
Not at all	19	28.8

Note: ART, antiretroviral therapy; PLH, people living with HIV.

Table 2

Description of antiretroviral therapy adherence.

Variables	Patients, %		<i>p</i>
	Non-adherent (<i>n</i> =13)	Adherent (<i>n</i> =53)	
Age (years), mean±SD	40.2±6.8	41.2±6.9	0.616
Male	53.9	62.3	0.753
Married	100	86.8	0.329
Annual income (yuan), mean±SD	3769.2±3205.6	2650.9±2591.8	0.188
Education (years), mean±SD	4.3±3.8	4.5±2.6	0.836
Years since HIV diagnosis, mean±SD	3.7±1.4	4.1±2.6	0.645
Ways to remind of taking ART medications			
Family/friend remind me	38.5	28.3	0.478
Use alarm clock or medicine box	23.1	30.2	0.742
Reminded by family members and friends			0.052
Never	0.0	24.0	
Sometimes	30.7	30.0	
Usually/always	69.2	46.0	
Burden of taking ART medications			0.150
Big	7.7	28.3	
Some	53.8	45.3	
Not at all	38.5	26.4	

Table 3

Relations between perceived burden and demographics and psychosocial variables.

Characteristics	Perceived burden of taking ART medication			<i>p</i>
	Not at all Mean or (%)	Some burden Mean or (%)	A big burden Mean or (%)	
Age (years)	42.6	39.5	42.0	0.2399
Male	68.4%	64.5%	43.8%	0.2741 ^a
Married	89.5%	87.1%	93.8%	0.7816 ^a
Education (years)	4.0	4.7	4.4	0.7319
Annual income (yuan)	4157.9	2177.4	2687.5	0.0408
Years since HIV diagnosis	3.6	4.2	4.0	0.7579
Quality of life	115.3	102.9	95.1	0.0086
Depressive symptoms	18.1	21.6	24.2	0.0008
Positive family interaction	45.5	44.9	42.3	0.0826

Note: ART, antiretroviral therapy.

^aPearson chi-square or Fisher's exact test.