Depressive signs, ART and risk behavior among HIV-patients in Hubei province, China.

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ABSTRACT

At the end of 2009 the HIV prevalence in China was estimated to 0.057% which corresponds to 740,000 people, 30.5% of these were women. Though the prevalence is still low some areas are more affected than others. Of the total number HIV-infected patients in China 105,000 has developed AIDS. HIV is starting to spread among the general population and does now not only affect high-risk groups. Several studies have also shown that depression is common among people living with HIV/AIDS.

The primary goal of this study was to investigate signs of depressive symptoms among HIV patients. The secondary aim was to investigate compliance of ART, positive and negative effects of ART, the patient’s general health, risk behavior, whether the HIV diagnosis affects the patient’s social relations, discrimination and finally general knowledge about HIV. The information was gathered through the distribution of questionnaires and interview based questionnaires among HIV patients at the Suizhou CDC, Hubei province, China. The results were compared with a control group consisting of undergraduate medical students.

Quite a large proportion of the responding patients (43%) got a total score on the MADRS-S over 13 points which is the cut off score for a mild depression. Sixteen percent had a score of 20 points or more, indication a moderate depression. Compared with the control group these results indicate more depressive signs. A statistic significant correlation was found between high education, low income, female gender and high MADRS-S score.

Generally the ART compliance was good, however some patients had ART combinations not conclusive with WHO guidelines from 2009. Overall the patients reported few side effects. Most patients had more positive than negative effects of the treatment. The patients also stated that they felt that their general health had improved since the start of ART.

Risk behavior was drastically reduced after HIV diagnosis among both men and women. A large majority of the patients, both men and women experienced some kind of discrimination due to their HIV diagnosis.
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INTRODUCTION

CHINA
China is the world’s largest countries with 1.3 billion inhabitants. The country is divided into 22 provinces, four large city areas (Beijing, Shanghai, Tianjin and Chongqing), five autonomous regions (Tibet, Xinjiang, Inner Mongolia, Ningxia and Guangxi) and the former colonies Hong Kong and Macao. Each province has a communist party provincial committee with a secretary who is in charge of the province. The Chinese population is divided into several different ethnic groups of which Han is by far the largest.

Hubei province
Hubei is a province in central China and is divided into thirteen prefecture-level divisions including Wuhan and Suizhou. In 2009 the population in Hubei was estimated to 59.49 million. Han is the dominating ethnic group in the province constituting 95.6% of the population.

Suizhou
Suizhou is a city in the Hubei province, located in the drainage area of the Yangtze River and the Huai River. The population was 2.58 million in 2004.

WUHAN UNIVERSITY
Wuhan University is considered to be one of the best and oldest (founded in 1893) higher learning establishments in China and is located in the capital of the Hubei province, Wuhan. The university is controlled by the administration of the Ministry of Education of the People’s Republic of China. Wuhan University is widely known for its cherry blossom garden. The university constitutes since 2000 of four major universities:

1. The former Wuhan University
2. The former Wuhan University of Hydraulic and Electrical Engineering (WUHEE)
3. The former Wuhan Technical University of Surveying and Mapping (WTUSM)
4. The former Hubei Medical University (HBMU)
HIV/AIDS

The HIV (Human Immunodeficiency Virus) is today a global epidemic which has affected the developing countries the worst. In 2008 about 33.4 million people in the world were living with HIV, 2.7 million new infections occurred and 2 million people died because of AIDS.9

Antiretroviral therapy (ART)

The purpose of antiretroviral therapy is to end the viral replication, giving the immune system the possibility to recover.10 As a result of this the CD4-counts can increase, reducing the risk of opportunistic infections and tumors. The number of CD4-counts decides when to begin the treatment, but also if the patient shows any signs of immunological failure or AIDS.11 According to the treatment recommendations from WHO ART should be initiated at a CD4-count level below $350 \times 10^6/l$. Studies have shown that an early introduction of ART is related with a lower morbidity and mortality.12

The antiretroviral therapy place high demands on the patient since a poor adherence may develop resistance against the specific treatment and cross-resistance against other treatments. Therefore it’s very important that the patient is motivated, since missed doses give the virus an opportunity to start replicate again.

Treatment of HIV infected patients constitutes of a combination of several different anti-HIV medicines. NRTI (nucleoside reverse transcriptase inhibitors) represent often two or more of the anti-HIV drugs. This specific group inhibits the enzyme, reverse transcriptase from converting HIV-RNA to DNA. Another group of anti-HIV drugs that often is included in the combination is NNRTI (non-nucleoside reverse transcriptase inhibitors) whose mechanism of action is based on the competitive inhibition of reversed transcriptase. Protease inhibitors (PI) inhibit the activity of a protease whose function is to split proteins into functional viral proteins and enzymes.12 Fusions inhibitors or entry inhibitors, inhibit the entry of the virus into the human cell (interference with receptor and coreceptor) and hindering viral replication.13 Integrase inhibitors inhibit the integration of viral DNA with human DNA and thereby blocking the viral replication.14 Finally, CCR5 antagonists block CCR5 a coreceptor that is needed for the virus to entry the human cell.15
Treatment recommendations suggest primary one of the following two combinations (in the presence of development of resistance against the specific treatment, lack of efficacy or side effects other combinations may be tested):

- 2NRTI+1NNRTI
- or
- 2NRTI+PI/r

**Side effects**
Side effects due to the ART can often be seen among the HIV patients. Each specific drug has its own specific pattern of side effects, but some are common to each group of anti-HIV drugs.\(^{12}\)

Examples of side effects during treatment with NRTI:
- Anemia
- Leukopenia
- Neuropathy
- Pancreatitis
- Headaches\(^{16}\)
- Mitochondrial toxicity:
  - Lipoatrophy, especially in the face and on extremities
  - Disturbed liver function and increased levels of transaminases
  - Lactate acidosis, with symptoms such as abdominal pain, nausea, vomiting, dyspnea and arrhythmia\(^{12}\)

Examples of side effects during treatment with NNRTI:
- Headache
- Insomnia
- Rash
- Steven Johnson
- Liver failure\(^{18}\)
Examples of side effects during treatment with PI:

- Diarrhea and other gastrointestinal symptoms
- Nausea
- Metabolic syndrome:
  - Increased levels of cholesterol and triglycerides
  - Glucose intolerance
  - Diabetes Mellitus
  - Cardiovascular diseases
  - Intra-abdominal fat

**HIV/AIDS IN CHINA**

At the end of 2009 the HIV prevalence in China was estimated to 0.057% which corresponds to 740,000 people, 30.5% of them were women. Though the prevalence is still low some areas are more affected than others,\(^1\) for example in the village Wenlou in Henan over 60% of the population is infected with HIV.\(^1\) Of the total number of HIV-infected patients in China 105,000 has developed AIDS. During 2009 it was estimated that 48,000 people became infected with HIV. HIV is starting to spread among the general population and does now not only affect high-risk groups.\(^1\)

The first case of AIDS in China was diagnosed in 1985.\(^1\) The Chinese HIV/AIDS epidemic may be divided into eight different phases. The first phase between 1985 and 1989 only consisted of a few sporadic cases, mainly foreigners and citizens who had lived abroad and been infected before returning back to China. Another affected group was Chinese citizens who received contaminated imported blood products. During the second phase that begun in 1989, particularly injecting drug users (IDUs) were infected. It is believed that the further spread of HIV in China originate from this specific group. In 1990 many commercial plasma donors became infected with HIV because of inadequate routines. They constitute the third phase. The problem was discovered in 1995 and after an introduction of laws that regulate plasma donation this issue is fairly limited. The fourth phase was people infected by transfusion of infected blood products. Sexual transmissions of HIV lead to the fifth phase.\(^2\) In 2009 sexual transmission was the most common route of HIV transmission in China.\(^1\) The eighth and finally the last phase include children that had been infected from their mother.\(^4\)
In 2009 8.1% of the infants who was born to a HIV positive mother, were also tested HIV positive.¹

National response to the HIV/AIDS epidemic

In 2003 the Chinese government introduced the “Four Frees and One Care” policy in order to improve the efforts to prevent and control the HIV/AIDS epidemic. The primary goal was to contribute with:

1. Free anti-HIV drugs to patients with economic difficulties or living in rural areas
2. Free testing and follow-up
3. Free anti-HIV drugs to pregnant women, with the aim to avoid mother-to-child transmission
4. Free schooling to children whose parents had died because of AIDS
5. Economic and social support to families affected by HIV/AIDS

Since 2003 the work has continued with improving and increasing the response to the HIV/AIDS epidemic in the country, with introducing the plan called “HIV/AIDS Prevention and Care Regulations” in 2006 and “Action for HIV/Containment, Prevention and Care in China (2006-2010)”.²²

Different measures have been implemented by the Chinese government during the recent years to improve the common knowledge and awareness about HIV/AIDS in the country, such as HIV education in school and engagement of different media such as television, radio and newspapers. Due to these different efforts a significant increase in basic knowledge has also been seen among the general population.

Attempts to control drug use and drug dealing, but also prostitution has been made by introducing different laws that prohibits such activities. The knowledge about handling with needles and the importance of condom use but also education about different STD has been taught to risk groups, and reduced risk behavior has been seen amongst sex workers and IDUs during recent years. Methadone maintenance treatment clinics for IDUs have been established around the country (27 provinces) and on a regular basis the patients are tested for HIV, hepatitis C and syphilis.
The government in China has issued different laws to control the quality of blood products in the country. All blood stations and laboratories must take part in specific quality evaluations that confirms that the use of the blood product is safe, and screening for HIV is today implemented on all collected blood products.1

**HIV/ AIDS IN THE HUBEI PROVINCE**

Eighty percent of the 69 million people living in Hubei province are farmers. The Hubei Province Center for Disease Control and Prevention (CDC) deal with treatment, screening, prevention and reporting of infectious diseases in the province, for example HIV. In 2003 the Hubei CDC and the Board of health initiated a HIV prevention and treatment program to handle the HIV situation in the province. During the program 3063 HIV positive people got diagnosed between January 2002 and August 2006 and 1143 patients started on ART between July 2003 and August 2006. Of the patients initiating HIV treatment 77% were plasma donors and 54 % had developed AIDS. The program also included stigma reduction activities and training of health workers. The result was significant with higher adherence to ART, better effect of treatment and decreased mortality among the HIV patients.21

**HIV/AIDS in Suizhou County**

The first case of AIDS in Suizhou was reported in April 2001. Between 2001 and 2005, 230 patients were diagnosed with HIV in the county with a majority of farmers from the village Fujiapeng. High proportions HIV patients in Suizhou have low income and many have been infected when selling blood products to make extra money.8 Of the 1143 patients that initiated ART during the prevention and treatment program between summer 2003 and 2006, 224 lived in the county of Suizhou. This made it the county in the province with the most patients on ART.19

**Blood donation in China**

As mentioned earlier a large proportion of the HIV patients in the Hubei province have been infected through plasma donation.19 According to traditional Chinese culture it is believed that all blood loss, including donation, has a negative effect on one’s health and that blood donation is disrespectful to one’s ancestors. This may be a reason why China always has had a problem with inadequate volumes of blood products in the national blood banks. Another reason may be the generous ordination of blood, usually whole-blood, in the Chinese
hospitals. China also has strict restrictions for import of blood products. The shortage led to a vast market for blood products with paid donors, which increased during the 1990’s. Most paid donors were poor and came from the countryside and needed the extra money to support themselves and their families. The possibility to make extra money also attracted people from different risk group such as IDUs. Methods used by the blood collectors were often inadequate and unsafe. Needles were often reused without sterilization between patients, collecting of information about risk behavior such as drug use were often lacking and at many sites the donors were not tested for HIV and hepatitis. During some collection of plasma the blood from donors with the same ABO group was pooled before the red blood cells were transferred back to the donors. HIV soon became widespread among blood donors. A study in Henan province in 1997 revealed that 17 % of 88 tested blood donors were HIV positive, compared to 0.2% of non-donors. A similar survey in 1999 in Hubei province showed that 9.2% of the donors tested were infected with HIV compared to 0.6% of non-donors.

In 1995 China’s ministry of health introduced a new law regulation the country’s blood donation. It forbid all unlicensed blood collection and stated that all donators of blood products had to be tested for HIV. The nation’s blood banks have pleaded the population to donate blood which in many provinces has had a significant effect. Illegal collection of blood products with unsafe methods still exist in many Chinese provinces but is not as widely spread as in the 1990’s.22

**DEPRESSION**

In a medical context the word depression represents a syndrome which can be caused by different reasons. Depression can be divided into different sub diagnoses. The so called major depression is the core of the unipolar depression group. Most research on depression is made on this specific subgroup. Major depression is diagnosed with the help of the DSM-IV criteria. To fulfill the diagnosis the patient has to have met at least five of the criteria during a two week period. At least one of criteria one or two must be present.
The criteria are:

1) Depressed mood most of the day, nearly every day.
2) Loss of interest or pleasure in all, or almost all, activities of the day.
3) Weight loss or weight gain, or decreased or increased appetite.
4) Insomnia or increased amount of sleep.
5) Psychomotor agitation or retardation.
6) Fatigue or loss of energy.
7) Feelings of worthlessness or feelings of guilt.
8) Lowered ability to concentrate.
9) Thoughts of death or suicide.

**Depression and HIV/AIDS**

Earlier studies have shown that depression is common among people living with HIV/AIDS. Some surveys even reveal that HIV/AIDS patients have a higher risk of depressive behavior and major depression compared to other patient groups. In 1997 an Australian study showed that 49.5% of the 192 participating patients showed signs of depression (≥14 points) according to the Beck Depression Inventory. These numbers can be compared with 33% of hospitalized cancer patients and 35% of patients with terminal renal disease on dialysis. The Australian team found that an AIDS diagnosis was a risk factor for depression but that the duration of known seropositivity was not.

Depression can be expressed differently in different cultures. In a comparison between depressed persons in China and North America it was found that the Chinese patients often had somatic symptoms while the North American group had more psychological symptoms.

Most investigations on depression among HIV/AIDS patients are made in western countries where the prevalence of HIV is low. Only a few surveys on the subject have studied Chinese HIV patients. In H. Jin et al.’s survey 79% of the participating HIV patients had had a major depression at some time in their life compared to 4% in the control group. The HIV-patients also had a higher prevalence of current depressive symptoms. When the investigators removed items concerning somatic symptoms and problems depressive symptoms was still
more common among the HIV-patients than in the control group. It was also found that suicidality was more common among HIV-patients than in the control group, 75% of the patients had thoughts of death, 57% had thoughts of suicide during low mood and 29% had planned their suicide.31

**MADRS-S**

MADRS-S (Montgomery-Åsberg Depression Rating Scale – Self-report) which is a self-rating scale commonly used to study the response to antidepressants among patients diagnosed with depression.32 It may also be used to evaluate severity of a depression.33 MADRS-S is also a useable tool for screening of depressive tendencies in an undiagnosed population.34 The purpose of the questionnaire is to investigate the patient’s present mental status and it consists of nine questions concerning mood, feelings of unease, sleep, appetite, ability to concentrate, initiative, emotional involvement, pessimism, zest for life. Each question concerns the patient’s feelings the last three days and begins with a short description of what the patient should focus on when answering. It is followed by four statements and three intermediate steps. Each response corresponds to a certain amount of points from zero to six.17

0-12 points not depressed
13-19 points mild depression
20-34 points moderate depression
>34 points severe depression35

The total score in combination with a deeper analysis of the specific answered questions may provide an indication whether the patient has a higher risk for a depression.36 High score does not necessarily mean that patient is suffering from a major depression and can’t be used alone for diagnosis.37 For diagnosis further investigation is needed with the help of the DMS-IV criteria.38
STIGMATIZATION AND DISCRIMINATION

The stigmatization of patients with HIV in Hubei, China is considered to be a crucial problem. Many of the patients express the fear of being discriminated at their workplace, by the general public but also by healthcare workers. Patients describe that they have been treated ill caused to their disease, even lost their job. A majority doesn’t have anybody to talk to and consider the discrimination to be much worse than the disease itself. The lack of knowledge about HIV contributes to the stigmatization and the difficulties the patients are forced to face. Improved knowledge about the disease is therefore an important part in reducing the discrimination and misunderstandings.39

These problems highlight the importance of confidentiality and the patient’s will to share experiences of the disease.

PURPOSE

The primary goal of this study was to investigate:

- Signs of depressive symptoms among HIV patients.

The secondary aim was to investigate:

- Compliance of ART.
- Positive and negative effects of ART.
- The patient’s general health.
- Risk behavior.
- Whether the HIV diagnosis affects the patient’s social relations.
- Discrimination.
- General knowledge about HIV.

A final aim was to make a brief comparison with last year’s study, to detect if there are any changes.

The initial aim of this study was to investigate the compliance to HIV-treatment. How is CD4 numbers developing? How common is laboratory and subjective side-effects? How common is metabolic complications? Is the patient’s daily life affected? Does the treatment lead to
more or less risk behavior? Does the number of patients telling their partner and relatives about the diagnosis increase or decrease? Has anything changed compared to last year’s study? Do the patients show any signs of depression?

Due to requests from supervisors at the location of the study the investigations primary aim was changed to focus on quality of life among the HIV patients by using MADRS-S to screen for depressive symptoms. The number of questions in the original questionnaire was reduced, leaving questions that could give relevant background information about the patients. Instead of interviews, seven included patients had the questionnaire read to them. At this time the patients had the possibility to ask questions regarding the questionnaire.
METHODS

STUDY SUBJECTS
Questionnaires were answered by a total of 96 patients during three weeks in November 2010 in Suizhou city, Hubei province, China. Nine questionnaires were interviewer-administrated at the CDC in Suizhou during one morning. These interviews took place in a waiting room and were performed by two interviewers in Chinese. The remaining 87 questionnaires were distributed at the CDC with the help of the staff and a HIV-positive woman who had good connections with other HIV-patients in the area. None of the authors were present at the distribution and collection of these 87 questionnaires since they were denied permission to visit the clinic.

Eligibility criteria for inclusion in the study were:
1) Aged over 18 years
2) HIV-positive
3) Receiving of antiretroviral treatment for at least two years
4) Given consent to participation in the study
5) Answered all the MADRS-S questions in the questionnaire.

QUESTIONNAIRE
The participants were informed in writing that participation was voluntary and anonymous, the purpose of the questionnaire and that all gathered information would only be used for this specific survey. When the nine interview-administrated questionnaires were distributed this information was also presented orally.

The questionnaire consisted of 29 questions and the MADRS-S with additional nine questions. The questionnaire was divided into three parts. The first part referred to background information, the second part to HIV-diagnosis and treatment, and the third part consisted of the MADRS-S.
The questionnaire was translated from English to Chinese and the MADRS-S was translated from Swedish to English by the authors and later from English to Chinese. Translation from English to Chinese was made by a medical student at Wuhan University. Some modifications were made in questionnaire to better suit Chinese culture and for a higher understanding. All questions were retranslated to English by a medical student at Wuhan University after the questionnaires had been distributed. At this time it was discovered that three questions concerning personal data (name, home address and telephone number) had been included and to some questions (10, 14, 18, 19, 22, 26, 28, 29) additional responses (such as “don’t know” and “I forgot”) had been added to questionnaire without the authors’ knowledge. Also an opportunity to skip question 16 if “0 times” had been answered to question 15 was given to the patients without the authors’ knowledge. This opportunity had consciously been avoided by the authors since this may cause some confusion among the responders.

**CONTROLL GROUP**

A control group consisting of 107 medical students at Wuhan University answered a questionnaire similar to the one distributed amongst HIV-patients, containing background information and MADRS-S. The questionnaires were distributed and collected at one occasion during an evening class. The control group was informed verbally and in writing that participation was voluntary and anonymous. They were also informed in writing the purpose of the questionnaire and that all gathered information will be destroyed after completion of the study. During the retranslation of the questionnaire from Chinese to English two new questions regarding name and student ID, unknown to the authors, were discovered. The respondents were instructed not to answer these two questions to maintain anonymity.

**DATA ANALYSIS**

The collected data was entered into EpiData v.3.1. The data was analyzed with SAS. Graphs and some numerical calculations were made in Microsoft Excel 2007. Tables were made with the use of Microsoft Word 2007. In some special cases special methods were used; ANOVA, t-test. A p-value of <0.05 was considered significant.
RESULT

A total number of 96 questionnaires were collected at the CDC in Suizhou. 15 questionnaires were excluded because the inclusion criteria were not fulfilled (Figure 1). The percentages in figures and tables below are based on the number of patients answering the specific question. When patients not answering the specific question have been included in the analysis, this information will be presented.

![Diagram](image)

**Figure 1: The exclusion process among the participating patients**

**SOCIO-DEMOGRAPHIC DATA**

The question concerning gender was answered by 80 patients. The study population consisted of 56 men (69%) and 24 women (30%). One patient (1%) did not answer this question but is still included in the study.
Mean age was 49 years with a range from 32 to 69. Among men the mean age was 51 years with a range from 36 to 69 and among women the mean age was 45 years with a range from 32 to 64.

All 81 patients answered the question regarding ethnicity. All belonged to the ethnic group Han.
Eighty patients answered the question regarding level of education (Figure 3), one male patient did not answer the question. The patient with unknown gender had only attended primary school.

The question concerning occupation was answered by 80 patients, one patient (male) did not answer the question. A majority of the patients, 53 men (96%), 21 women (88%) and the patient with unknown gender were farmers. One man (2%) was self-employed. One man (2%) and three women (12%) were unemployed.

Eighty patients answered the question regarding yearly income, one man did not answer. Most of the patients, 33 men (60%), 23 women (96%) and the patient with unknown gender, had an income of 1000¥ or less. Thirteen men (24%) had an income between 1001 and 3000¥. Nine men (16%) and one woman (4%) had an income between 3001 and 5000¥ each year. None of the patients had a yearly income of more than 5000¥.

Fifty-five of the male (98%), 22 of the female patients (92%) and the patient with unknown gender replied that they lived their own house. One man (2%) and two women (8%) in the patient group responded that they rent an apartment.

All 81 patients answered the question regarding their civil status. Forty-nine men (87%), 22 women (92%) and the patient with unknown gender were married. Two men (4%) were
separated or divorced. Five men (9%) and two women (8%) answered that they are widowers/widows.

### HIV DIAGNOSIS

![Figure 4: Distribution of the year each patient was diagnosed with HIV.](image)

A total number of 79 patients answered to the question penetrating what year they were diagnosed with HIV, two patients did not respond to this specific question.

Forty-seven of the 56 male patients (84%) have told someone about their HIV diagnose and all female patients (n=24) have informed another person about their HIV diagnose. Eight men (14%) haven’t told anyone about their HIV diagnose and one man (2%) forgot. Finally, the patient with unknown gender has also told someone about the condition.
Figure 5: Distribution of the years when the patients initiated their HIV treatment at the CDC in Suizhou.

Figure 5 show that most patients started their ART in 2003. Four patients did not answer this specific question.

Figure 6: Distribution of ART combination among the patients.
The question concerning the patient’s combination of ART’s was answered by 72 patients (Figure 6). Nucleoside analogues used by the patients included zidovudine (AZT), lamivudine (3TC), stavudine (D4T). NNRTIs used included nevirapine (NVP) and efavirenez (EFV). The most common combination was AZT + 3TC + NVP.

On the question “Have you ever interrupted or stopped your HIV treatment?”, three of the 56 male patients (5%) answered that they had. None of the female patients or the patient with unknown gender have interrupted or stopped their treatment. Eight of the male (15%) and four of the female (17%) patients have during the latest four weeks forgotten one to two times to take their ART. One man (2%) has forgotten three up to six times to take his medication. The patient with unknown gender has during the latest four weeks never forgotten to take the ART. One patient (man) did not answer this specific question.

<table>
<thead>
<tr>
<th>Reasons why patients forgot to take their medication</th>
<th>Percent</th>
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<tr>
<td>Simply forgot</td>
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<tr>
<td>Busy with other things</td>
<td></td>
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<tr>
<td>Was asleep</td>
<td></td>
</tr>
<tr>
<td>Felt ill or sick</td>
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<tr>
<td>Felt sad or depressed</td>
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<tr>
<td>Didn’t want others to notice me taking…</td>
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<tr>
<td>Not enough prescribed pills</td>
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<tr>
<td>Embarrases buying medicine</td>
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Figure 7: Reasons why male and female patients forgot to take their ART.

Twelve patients answered the question regarding why they had forgotten to take their ART (Figure 7). The patients were told that they could give more than one answer to this question. The most common reason for not taking the medicine was that the patient was busy with other things.
Figure 8 shows the positive and negative effects after ART among men (n=56) and women (n=24) in the patient group. For the male patients the most common negative effects were sleeping disturbance (16%) and loss of appetite (16%), followed by skin rashes (15%). Among the female patients the most common negative effects were feeling depressed (13%) and...
skin rashes (13%). Two female patients answered other, not specifying type of negative effect.

Among the men, increased appetite (16%), gaining weight (13%) and better sleep (13%) dominated the positive effects after ART. Also in the female study population increased appetite (29%), gaining weight (29%) and better sleep (21%) were common. The patient with unknown gender experienced skin rash, changed sensibility in feet, more fat on abdomen and neck, weight gain, increased appetite and energy.

**Figure 9:** Distribution of the patient’s evaluation of their general health before starting HIV treatment, men (n=56) and women (n=24).

**Figure 10:** Distribution of the patient’s evaluation of their general health after starting HIV Treatment, men (n=56) and women (n=24).
All 81 patients answered the questions concerning their general health before (Figure 9) and after (Figure 10) they commenced HIV treatment. The patients were asked to evaluate their health on a scale from one to five, one representing very poor and five excellent. Most patients, both men and women, rated their health before treatment as number three (not bad). Twenty men (36%) answered number four (good). When evaluating their health after starting HIV treatment a majority of the patients, both men and women, answered number four (good). The patient with unknown gender described the general health before treatment as a number two, and after as a number four. None of the patients rated their health as excellent after commencing treatment.
**RISK BEHAVIOUR**

**Figure 11:** Distribution of male and female patients who did/did not use condom before being diagnosed with HIV.

**Figure 12:** Distribution of male and female patients who did/did not use condom after being diagnosed with HIV.

Figure 11 and 12 show the condom usage among men and women before and after HIV diagnosis. All patients (n=81) answered this specific question. A majority of the male (82%) and the female (79%) patients did not use condom before HIV diagnosis, and dramatic increase of condom usage can be seen in both groups after HIV diagnosis. The patient with unknown gender did not use condom before diagnosis but started after.

All 81 patients answered the question if they had bought any sexual services before they got their HIV diagnosis. Four men (7%) replied that they had and the rest of the patients that
they had not. Eighty patients replied the question asking if they had bought any sexual services after they found out they were HIV positive. All of the patients that answered the question relied that they had not.

All patients (n=81) responded the question regarding whether they had donated blood or plasma before they were diagnosed with HIV. A majority of the patients, including the one with unknown gender, had donated blood or plasma before diagnosis (Figure 13).

On the question concerning receiving of blood or plasma before diagnosis, three male patients (5%) and four female patients (17%) had received blood or plasma transfusion. Two men and the patient with unknown gender answered that they didn’t know whether they had received blood or plasma before diagnosis. All patients (n=81) answered this specific question.
HIV KNOWLEDGE

Figure 14: The patient’s knowledge about HIV transmission routes.

All 81 patients answered the question regarding the knowledge about how HIV is transmitted. Figure 14 shows the distribution of statements the patients have answered is a route of HIV transmission. 50 patients (62%) had all the correct answers. During analysis of the eight interview administrated questionnaires only one patient had all answers correct. Of these eight patients two answered that they don’t know if HIV is transmitted by sexual intercourse without a condom.

Figure 15: Distribution of what the patients believe may happen if they forget to take their ART.
The question concerning what the patients believe may happen if they forget to take their HIV medication was replied by 76 patients. The patients were told that they could give more than one answer to this question. Most of the patients, including the patient with unknown gender, replied the correct answer that the virus may become resistant to ART. Thirty-three (65%) of the men and 17 (71%) of the women had the correct statement as their only answer. Among the interview administrated questionnaires none of the patients replied the correct answer.

**DISCRIMINATION**

A majority of the study group, both men and women, say they have experienced discrimination. Only three patients, two men and one woman, replied that they had not. Seventy-nine patients answered the question.
Eighty patients answered the question penetrating where they experience discrimination due to their HIV diagnosis. Most of the patients experience discrimination from people in their hometown. The men experience more discrimination at work than the women. A significant difference was found concerning discrimination in school, women (%; 95%CI 43-81) experienced more discrimination than the men (%; 95%CI 15-38). The patient with unknown gender experienced discrimination in the public health care and from people in the hometown.
Figure 18: Distribution of the patient’s groups total score on the MADRS-S. (The percentages in the figure are presented on a logarithmic scale).

All 81 patients included in the study answered all questions in the MADRS-S, which was one of the criteria to be included in the survey. As figure 18 shows there was a great spread of the total scores among the patients. Zero points was the most common score among men (27%) and nine and 19 points were the most common scores among women (17% respectively). The patient with unknown gender got nine points.
Figure 19: Distribution of the patient’s score on MADRS-S question 1, mood.

Figure 20: Distribution of the patient’s score on MADRS-S question 2, feelings of unease.

Figure 21: Distribution of the patient’s score on MADRS-S question 3, sleep.
Figure 22: Distribution of the patient’s score on MADRS-S question 4, appetite.

Figure 23: Distribution of the patient’s score on MADRS-S question 5, ability to concentrate.

Figure 24: Distribution of the patient’s score on MADRS-S question 6, initiative.
Figure 25: Distribution of the patient’s score on MADRS-S question 7, emotional involvement.

Figure 26: Distribution of the patient’s score on MADRS-S question 8, pessimism.

Figure 27: Distribution of the patient’s score on MADRS-S question 9, zest for life.
Analysis of the nine MADRS-S questions shows that overall the study population got relative low scores, a majority of the patients got zero to three points. The patient with unknown gender got the following results: Question 1: Zero points, question 2: Two points, question 3: zero points, question 4: zero points, question 5: two points, question 6: one point, question 7: two points, question 8: one point, question 9: one point.

![Table 1](image)

Table 1: Comparison between the mean score on the MADRS-S and level of education among the patients in the study population.

Table 1 shows that a significant higher mean score can be seen among patients with a higher education (p-value 0.0281). All patients except for one (n=80) answered the question regarding level of education, and is therefore not included in the comparison.

![Table 2](image)

Table 2: Comparison between the mean score on the MADRS-S and the occupation among the patients in the study population.

No significant increase of the MADRS-S mean score, due to occupation can be seen among the patients, p-value 0.0859 (Table 2). Eighty of 81 patients in the study population have answered the question concerning occupation and are included in the comparison.
Table 3: Comparison between the mean score on the MADRS-S and the yearly income among the patients in the study population.

Table 3 illustrates that the lower the patients income is, the higher mean score on the MADRS-S the patients get (p-value <0.001).

Table 4: Comparison between the mean score on the MADRS-S and the living conditions among the patients in the study population.

Table 4 shows that the mean MADRS-S score among the patients in the study population can’t be related to the patient’s living conditions, no significant increase of the average score can be seen (p-value 0.2418). All patients (n=81) are included in the comparison.

Table 5: Comparison between the mean score on the MADRS-S and partner status among the patients in the study population.

Table 5 illustrates that the mean score of the MADRS-S shows no correlation to the patient’s partner status, p-value 0.9309.
A comparison (Table 6) between men and women, indicates that female patients (n=24) get a significant higher mean score on the MADRS-S than the male patients (n=56), p-value 0.0112.

CONTROL GROUP

The control group consisted of 107 medical students, 54 (51%) women, 47 (44%) men and 6 (5%) who did not answer the question regarding gender. The age range was between 18 and 23, with a mean age of 20.3 years. 17 (16%) students did not answer the question concerning age. Eighty-four (79%) students replied they belong to the ethnic group Han, 15 (13%) that they belong to another ethnic group and 8 (8%) did not answer the question. Concerning allowance, two (2%) students answered 0-300 Yuan, 45 (43%) answered 301-600 Yuan, 39 (36%) answered 601-1000 Yuan, nine (8%) answered >1000 Yuan and 12 (11%) did not answer the question.

<table>
<thead>
<tr>
<th>Gender</th>
<th>n=80</th>
<th>Mean MADRS-S</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>56</td>
<td>9.14</td>
<td>8.26</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>14.17</td>
<td>7.01</td>
</tr>
</tbody>
</table>

Table 6: Comparison between the mean score on the MADRS-S and gender.
Figure 28: Distribution of the control group’s total score on the MADRS-S.

Most students got a low MADRS-S score. Questions where many students got points was question number five (ability to concentrate) and eight (pessimism). Of the six students with unknown gender one student got six points, one got eight points, two got 11 points and the last two got 21 points.
COMPARISON PATIENT AND CONTROL GROUPS

A comparison between the patient’s and the control group’s total MADRS-S score shows a trend of patients getting slightly higher scores than the controls.

Figure 29: Comparison between patient and control group’s total score on MADRS-S.
DISCUSSION

SOCIO-DEMOGRAPHIC DATA

A majority of the study population were men which is consistent with earlier surveys of the distribution of HIV in China. In 2003 the quota between HIV infected men and women were 3:1 but the gap is slowly narrowing. The mean age of the study population for men as well as women was around 50 years. The HIV prevalence among Chinese between 15-49 years was low (0.1%). As described earlier one of the main routes of infection among the HIV patients in Suizhou was commercial blood donations. These donors were mainly farmers from poor rural areas. This was reflected in the study where the majority of the patients were relatively low educated farmers with low income. Most of the patients were married and lived in their own house. This implicates that many of the patients have an organized and structured lifestyle which in turn might have led to selection bias for admittance to treatment and participation in the study. Marriage can be a risk factor for transmission of the virus to family members. Liu H et al showed that HIV transmission frequently occur within families, for example between spouses and from mother to child. These findings were consistent with last year’s study.

HIV TESTING AND DISCLOSURE

The vast majority of the patients got their HIV diagnosis in 2003. This can be explained by the so called “Four Frees and One Care” policy introduced by the Chinese government the same year. As mentioned earlier one of the primary goals of this reform was to provide free HIV testing, follow up and free antiretroviral drugs in order to prevent and control the HIV/AIDS epidemic in China. In 2003 the CDC in the Hubei province also initiated a separate program, with the goal to get HIV infected people diagnosed and treated. Last year’s study by Sjögren, Johnsson, Shangpeng and Endo, indicated that the main reason for HIV testing among the patients was the CDC checkup control, which is free of charge.

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The fear of discrimination is an important barrier for testing of HIV, but also insufficient counseling. As shown last year eight male (none of the female) patients quoted that they had not told anyone regarding their HIV diagnose. This may be explained by the fact that these eight men had a higher yearly income (3001-5000¥) and therefore might be landowners and high respected in the area. As shown last year one of the main reasons for not telling other was the fear of being discriminated, but also shown in the interviews the fear of losing their job.

Sharing with family/friends HIV diagnose is not only important for getting emotional support and help in decision making, but studies have shown that sexual risk behavior reduces after counseling thereby preventing further HIV transmission. It has also been demonstrated that disclosure also might help the patient accept and understand his or her diagnose, resulting in a better self-esteem and coping with the HIV infection.

**ANTIRETROVIRAL TREATMENT**

Most patients initiated their treatment in 2003. This is logical since ART begun to be distributed in 2003 as a part of the “Four Frees”. The most common ART combination (AZT+3TC+NVP) is one of the combinations that WHO recommend for HIV patients starting on treatment. However, 29 patients (36%) of the patients had an ART combination including stavudine (d4T). In WHO’s guidelines from 2009 it is stated that stavudine should be phased out due to its long-term and irreversible side-effect (peripheral neuropathy, lipoatrophy and risk for lactic acidosis). Furthermore 11 patients (14%) had a combination including both stavudine (d4T) and didanosine (ddl), a combination that WHO recommended not to be used together due to overlapping toxicities. Despite these recommendations stavudine is still a part the treatment of 56% of HIV patients worldwide. This probably is because the drug is cheaper than alternatives, such as tenofovir (TDF) and asacavir (ABC), and also requires less laboratory monitoring. Still, it ought to be important for the medical system to aim for what is best for the patients. Even though stavudine may seem as a cheaper and easier alternative one have to consider the excessive costs that may follow due to the side effects, both emotionally for the patient and economically for the society. The ART strategy has changed since last year when d4T/3TC/NVP was the most common
combination of ART. This may be an indication that the CDC in Suizhou is starting to adjust to the WHO recommendations to phase out stavudine.

Only three patients stated that they had interrupted or stopped their ART at some point during the whole length of treatment. However, this is inconclusive with the fact that 13 patients (16%) answered that they had forgotten to take their medicine at some point during the last four weeks. This inconclusiveness indicates that the patients may have misunderstood these questions and that the number of patients that ever have made an interruption in their ART probably is higher than the result in this survey. The fact that 16% of the patients have forgotten to take their pills at some time during the past four weeks is worrying since this may be a sign of poor adherence which may lead to resistance development. The fact that the statement “busy with other things” was the most common explanation to why the patients had not taken their medication indicates that the medication is not a priority among the patients. This could probably be altered with further education of the patients about the possible consequences of missed pills. The third most common reason for not taking the ART was that the patient did not have enough prescribed pills. This may be explained by patients having to travel long distances to get to the CDC. One way to get closer to a solution of this issue could be to subscribe larger amount of pills at each time the patient visit the clinic. On the other hand it is important not to have to long intervals between patient-doctor meetings since the patient could develop serious side effects without the doctors’ knowledge and without possibility to interfere. Perhaps patient education is a good alternative here as well. If the patients know the importance of continuous treatment and risk of side effects they could take the time to travel to the clinic.

Overall the patients reported few side effects. Weight loss and neuropathy which are dreaded side effects were unusual in the survey. Most patients had more positive than negative effects of the treatment. The patients also stated that they felt that their general health had improved since the start of ART. These positive results indicate that the ART is successful in the Suizhou region and that the use of stavudine, which negative effects were discussed earlier, may not have a very large impact on the patients’ health. The findings of more positive than negative effects and an improvement of experienced health after initiation of ART among the patients are cohesive with last years’ study. This years’ survey showed slightly less side effects among the patients than last year. However, this may be a
result of selection bias since none of the authors had insight in the selection of patients answering the questionnaire. Another explanation could be that patients who have suffered many side effects simply stopped taking ART.

**RISK BEHAVIOUR**

Condom usage increase drastically after HIV diagnoses in both groups. Alarming three men answered that they don’t use condom during sexual intercourse. Even though this is not a very high number, it is still three men who have not understood the purpose of condom usage and how HIV is transmitted! A possible explanation might be that these men are in a relationship with another HIV positive woman, and therefore have a mutual understanding regarding not using condom during sexual intercourse. One female and two male patients answered that the use condom sometimes, which is as frightening as not using condom at all.

In 2009 sexual transmission was the most common route of HIV transmission in China.\(^{51}\) Choi et al. showed in their study among their patients that the median age for sexual initiation was younger for men than for women but also only a small fraction of these men (12%) and women (15%) used condom, implicating the importance of education concerning condom usage and how STI are transmitted.\(^{52}\) Last year’s study by Sjögren, Johnsson, Shangpeng and Endo showed that there was a low frequency of condom usage with temporary partners, which might explain some of the inconsistent usage of condom in this year’s study. Men also tend to have more sexual partners.\(^{53}\)

Four men answered that they had bought sexual services before they were diagnosed with HIV, but none after. The numbers of cases due to heterosexual HIV are increasing in China, roughly 49% of the 70000 newly infected since 2005 were from sexual transmission.\(^{54}\) Statistics show that sex workers often have inconsistent use of condom during sexual intercourse.\(^{55}\) Different studies have shown that sex workers also tend to have a higher risk of STIs.\(^{56}\) By introducing different laws against prostitution, the Chinese government is trying prevent such activities and the transmission of different STI.\(^{57}\) This reform together, with sigma and discrimination the sex workers face may prevent them from testing for HIV, getting the adequate treatment but also the knowledge of being infected and therefore preventing further transmission of the disease. Based on these facts it is possible that some
of the patients who have but sexual services, might have been infected during these meetings.\textsuperscript{58} The low number of participating patients that have bought sexual services may also have been affected by the ability of free care among plasma infected patients, which therefore constitutes a large proportion of the study population.

A majority of the patients have donated blood or plasma before they were diagnosed with HIV. These data are consistent with known facts, that as mentioned earlier a large proportion of the HIV patients in the Hubei province have been infected through plasma donation in order to earn some extra money to survive.\textsuperscript{59}

**HIV KNOWLEDGE**

Overall the knowledge of transmit routes of HIV was good with over 90% correct responses on each correct answer. A quarter of the patients answered that they believe HIV is transmitted through kissing which indicates that there despite all the correct answers is a lack of knowledge on how the disease is not transmitted. The good knowledge result is cohesive with last years’ study where the knowledge level also was high.

Regarding what may happen if the patients don’t follow their prescribed ART the knowledge was good overall, which was cohesive with last years’ results. However, among the eight included patients whose questionnaires were interview administrated the results are quite different. None of these eight patients answered the question correctly.

These diverse results on the question concerning effects of forgotten ART pills indicate selection bias among the non-interview administrated questionnaires. Another fact that suggests selection bias is the good results on HIV transmission knowledge combined with the fact that three patients that don’t use condom during intercourse (see above), that indicates a lack of knowledge on HIV transmission.

**DISCRIMINATION**

A large majority (over 90%) of the patients, both men and women experienced some kind of discrimination due to their HIV diagnosis. This conforms to previous studies that have investigated stigma against people living with HIV.\textsuperscript{60, 61} Stigmatization of people living with HIV is a major and wide spread problem in China. Investigations have shown that 40% of the
Chinese population avoids any contact with HIV infected persons. During interviews in last years’ study patients said they felt that the discrimination was worse than the disease itself. The most common location for experienced discrimination in the survey was from other villagers; over 80% of the participants gave this answer. Surprisingly a large proportion of the patients had experienced stigmatization in the public healthcare. One might think that people with medical education would be less prejudiced against people living with HIV. Deacon et al presented that stigmatization attitudes are common in the Chinese health care. Factors that increased stigmatization included level of medical education, knowledge about HIV, experienced risk of being infected with HIV at work and exposure to HIV patients. It is quite surprising that factors like high exposure to HIV patients increase rather than decreasing stigmatization. Deacon et al present a theory that the exposure might contribute to a feeling of status difference among the medical personnel.

**DEPRESSIVE BEHAVIOUR**

Quite a large proportion of the responding patients (43%) got a total score on the MADRS-S over 13 points which is the cut off score for a mild depression. Sixteen percent had a score of 20 points or more, indication a moderate depression. In the control group 10% had a score of 13 points or more. Only two percent of the students had a score of 20 points or more. These numbers indicate more depressive signs among the HIV patients than in the control group. As mentioned earlier many previous surveys have shown that depression is widespread among people living with HIV. Jin et al had results with a higher proportion of patients with depressive signs than this survey. Lacking anonymity and selection bias is a likely explanation to the lower proportion of patients with depressive tendencies in this study compared to Jin et al’s. The deficiency of anonymity may have led to some under reporting of symptoms of depression and it is likely that many patients would have gotten a higher score if participation had been anonymous (for example no name etc. on the questionnaire). Despite this fact 58% of the patients got more than zero points on the question concerning suicide and one patient got the highest score on the same question. The result on this specific question is alarming. Further investigation is therefore necessary since it is important to identify the patients with depressive signs, especially patients with suicidality, so they can get the support and treatment that they need.
A statistic significant correlation between level of education and depressive behavior was found among the patients. High education meant higher scores on the MADRS-S. This may be explained by the risk of facing stigmatization in high educated groups in society.

The relationship between low income and higher score on the MADRS-S was also statistic significant. In this case it might not be the HIV disease that causes the higher score, but the patients’ living conditions due to the income.

Another significant correlation was found between high MADRS-S score and gender, with women having more depressive signs. This is a well-known fact and female gender is even considered a risk factor for developing depression.69

No statistical significance association was found between MADRS-S score and occupation, partner status and living conditions.

**LIMITATIONS**

Unfortunately this study has the following limitations:

**Questionnaire**

Due to cultural differences some alterations of the questionnaire was made during translation from English to Chinese.

Some of the questions seemed to have been misunderstood by the patients, perhaps due to the use of difficult words.

In the questionnaire in Chinese that was distributed, the questions were very close making it hard to separate them from each other. This might explain why many patients had not answered the question concerning other diseases because they simply did not see it.

Another problem with the construction of the questionnaire was that it included a part where the respondent should skip a question if they answered in a specific way. This may cause some confusion among the respondents. The interview based questionnaires were collected in a waiting room, decreasing the respondents’ anonymity.

Since the authors had limited insight in the selection of participating patients there is a risk of selection bias. Further a majority of the questionnaires were distributed without the
attendance of the authors making it impossible to know under which circumstances they were answered. If a doctor or other health care personnel were present this may have affected the patients to answer in a specific way to avoid negative effects on patient-doctor relationship.

Language barrier
The language barrier was a problem, especially regarding the questionnaire. It led to the authors missing alterations in the questionnaire and that the Chinese version probably is not an identical version of the English one. The interview based questionnaires were collected in Chinese and translation to English inadequate, making it likely that important information did not reach the authors.

Cultural differences
Because of cultural differences the design of the investigation has been altered to better suite Chinese culture for better or worse.

Participants
Since the number of participants were low many of the observed differences are not statistically significant.

Control group
The control group is unfortunately not comparable with the study population since it consisted of younger, healthier and higher educated persons.
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