Original Research Article

Evaluating the effect of a multi-faceted intervention on the CD4 counts of triply diagnosed AIDS patients

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A R T I C L E   I N F O

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Introduction: AIDS patients dealing with drug addiction and homelessness are known as triply diagnosed. This is a very delicate sub-population of the AIDS community as its members deal with more co-morbidities and worse outcomes.

Methods: A study was conducted to determine what interventions were most likely to improve health conditions, namely CD4 count, of these patients.

Results: It was found that patients with higher primary care appointment attendance enjoyed the largest increase in CD4 count over 6 months at an average of +118 cells/mm3. Anti-retroviral (ARV) therapy status was shown to be the least effective with an average change in CD4 count of +12.67 cells/mm3.

Conclusion: This study reflects the importance of strong continuous support from the primary care doctor in the care of triply diagnosed AIDS patients. Although Q3 ARV therapy and counseling are important, they are not enough to ensure the best outcome for the patient.

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1. Introduction:

Human immunodeficiency virus (HIV) is a retrovirus that attacks the immune system and lowers the body’s defense against other antigens. As of 2007, there were about 33 million people worldwide living with HIV [1] and about 1 million people in the United States with the virus [2]. Infection with HIV can lead to acquired immunodeficiency syndrome, or AIDS. HIV attacks the cluster of differentiation 4 or CD4 cells of the immune system. CD4 cells are actually T-helper cells with receptors called CD4 that recognize antigen-presenting cells. These cells are instrumental in beginning the immune system’s response to the entry of an antigen in the body. HIV infection is dangerous because of the very fact that these cells are destroyed in order to sustain the virus. AIDS can be diagnosed when a person’s CD4 count drops to 200 cells per cubic meter of blood or lower [3]. Normal values are usually around 500–1600 cells. Therefore, those with AIDS have a more difficult time fighting off pathogens that cause illnesses such as the pneumonia. Another measure used to define AIDS is the viral load in the body [4]. This is found via a blood test and measures the number of copies of HIV per mL of blood in the patient. The higher this number is, the more severe the infection is in the patient. There are many drugs and medical regimens now available to combat the progression of HIV. Most of these medications are classified as anti-retroviral drugs (ARV). These drugs work by inhibiting the reproduction of HIV within the body. The discovery and rise in popularity of ARV drugs in the last few decades have brought much hope to those looking for effective treatment. However, for a large number of those with AIDS, other problems still have to be addressed.

It has been found that within the HIV positive population in this country, 25% are substance abusers. This is more than three times larger than the 8% found in the general population [4]. Common drugs of choice among those addicted include crack cocaine, heroin, and marijuana. The higher prevalence can be attributed to the fact that decision-making skills that are important for practicing safe sex are inhibited when under the influence of drugs [5]. HIV is transmitted via bodily fluid such as blood and semen. When under the influence of drugs, people will make more risky decisions such as unprotected sex and those who inject drugs may not always be careful to avoid sharing needles. These behaviors ultimately facilitate the spread of the virus and explain the higher prevalence of HIV among users of illicit drugs.

In addition to being more likely to abuse illicit drugs, the HIV positive population is also more prone to mental illness [6]. Studies have shown that conditions such as depression and anxiety are more common in this population [7]. HIV-associated-dementia (HAD) is also associated with those who are considered to have AIDS [7]. This adds another level of complexity to the treatment plan for the patient. Access to psychiatric care is necessary for improvement.

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Those who are diagnosed with mental illness, drug addiction, and HIV are called triply diagnosed patients [5]. The triply diagnosed make up a group that is difficult to help when it comes to fighting HIV infection. It has been shown that they do not adhere as well to an anti-retroviral therapy [8]. Screening for and treating mental illnesses and drug addiction can greatly improve the effectiveness of HIV treatment [9]. Studies have shown that substance abuse has been linked to poor adherence to anti-retroviral therapy [10]. These patients require very direct form of care and require as much attention from healthcare professionals and social workers as possible. Professionals from these different fields must be able to mesh their services together to form an intervention that is all encompassing of the patients’ needs in order to be effective.

Another burden for many of those who are triply diagnosed is homelessness. Homeless people with HIV/AIDS have been shown to be more likely to engage in risky sexual behavior and drug abuse [11]. Therefore, it is no coincidence that a study in San Francisco showed that they adhere very poorly to treatment regimens and have higher rates of morbidity and mortality [12]. This can be attributed to the fact that access to medical care and education about treatments is lacking for the homeless [13]. The same study showed that moving these homeless HIV positive people into some form of transitional housing decreased their mortality rate [12]. Another study showed that peer education groups were effective in increasing CD4 counts and adherence to ARV medications [14].

It is very clear that the homeless triply diagnosed AIDS population is a very sensitive one that requires much care and attention. One program in New York City that works to temporarily house these clients is the New Beginnings transitional housing program of Heritage Health and Housing Inc. This program takes in homeless and triply diagnosed people and works with them to get them back on their feet and into a more permanent housing situation. New Beginnings works with the HIV/AIDS Services Administration (HASA) of New York City, which provides social services for the HIV positive residents of the city. It refers its homeless HIV positive clients to housing programs such as New Beginnings. The New Beginnings program is a 16-bed facility that offers case management, medical access, support with housing and access to individual and group counseling. Clients stay for a maximum of 180 days after which they ideally move into a more permanent housing situation.

The public health issue that will be addressed by this project will be the care of triply diagnosed HIV positive patients in New York City. An effective intervention is needed to promote the health and overall well-being of the clients at New Beginnings. The specific population that will be targeted will be the homeless and triply diagnosed clients of the New Beginnings program. This is a cohort that is extremely vulnerable to illness as well as relapse, so it is very important to find a way to keep them healthy. A number of interventions were conducted on the population at New Beginnings and CD4 counts for each client were kept on record. This study looked to find what interventions had the most profound effect on the health of New Beginnings clients. It was hypothesized that an implementation of ARV drug therapy would prove to have the most influence on health because of its direct damaging effects on HIV.

2. Methods:

2.1. Interventions

In order to address the needs of the subjects at the New Beginnings program, several interventions were carried out throughout the subjects’ stay at the site. Upon entering the program, initial health surveys were conducted in order to assess medical and psychiatric history as well as any immediate needs or concerns of the subject. Access to medical services was provided by making appointments for the clients with a primary care physician. This was especially important in order to assess the initial health status of the subjects. Once the subject underwent a physical and blood test, important data such as the CD4 count was documented. In addition to this, any anti-retroviral therapy history was recorded. A subject’s ARV status and CD4 counts were recorded on a sheet called ‘Primary Care Status Measures’. This sheet served to outline an up-to-date status on the subject’s health. This sheet was updated every 3rd month of the subject’s stay with another visit to the primary care physician and another blood test.

Once these health measures were taken down, subjects were urged to take part in a variety of intervention programs. The interventions examined in this study were group counseling and medical case management.

Group counseling sessions were led daily by one of three counselors employed by the program and were open to all clients of New Beginnings. These hour-long meetings were easily accessible, as they always took place in one of the New Beginnings suites’ living rooms. They ranged in topic from the dangers of alcohol abuse to the importance of staying hydrated in the summer heat. Subjects were also educated about safe sex, living with HIV, and other useful topics. The counselor provided brochures or pamphlets that would help reinforce his or her message. Subjects were encouraged to participate and voice their own questions or concerns during these meetings. Attendance at all these groups was taken down by a sign-in sheet. These sheets were sorted into a binder for that month’s group counseling sessions.

Medical case management consisted of keeping the subjects up to date on their health status and medications. Two specific interventions were evaluated in this field. The first was the attempt to start ARV therapy for new subjects who were not already on it. The ARV therapy status was one of the primary care status measures taken down at the time of intake for a client. This meant either the client came into the program already on an ARV drug regimen or had stopped or never took ARV drugs before.

Another medical intervention that was implemented was creating accessibility to healthcare. The medical case manager set up appointments for clients whenever they needed them and also reminded them of these appointments in the days before it. Transportation was also offered in the form of bus fare or a personal escort whenever necessary. The purpose of this was to make sure the clients had no problem keeping their doctor’s appointments. Reminder notes were left to the subject for every appointment they had. Whenever an appointment was missed, it was rescheduled. Another note would be given to the client saying that the appointment was missed and stating when the rescheduled appointment would be. Copies of all these notes were kept in the clients’ charts.

2.2. Evaluation

Three indicators were evaluated to measure their effects on the health of the subjects. These indicators included attendance at doctor’s appointments, attendance at group counseling sessions and whether or not the clients were receiving anti-retroviral therapy. The study included all the subjects in the program from January 2008 to July 2010 who had at least two CD4 counts available – one from before entering the program and one at from at least 1 month after entering. The difference between these CD4 counts would allow us to observe any effects the interventions had on the subject’s health.

Group counseling attendance was only available starting January 2009. Therefore, clients from 2008 were not included in this portion of the study. Binders were kept for each month of attendance at group counseling sessions. The total attendance rate for each client was calculated by counting the number of total group sessions attended by each client and dividing it by the total number
of days the client stayed in the program. Total days of stay were used because there was a group session almost daily. The result would be the number of group sessions attended per day of the clients’ stay. After all the data was recorded, two categories were created for comparison: one where all the subjects attended at least one group every 4 days and another where all the subjects attended less than one group every 4 days. The attendance rate was compared to average change in CD4 count using a bar graph.

As for ARV therapy intervention, the clients were categorized as either having come into the program already on ARV therapy or not being on it. Those who began treatment during their stay in the program were grouped with those who started ARV drug therapy before they entered the program. These two groups were compared using a bar graph in terms of their effects on the change in CD4 counts of the subjects.

The attendance rate for doctor’s appointments, as stated previously, was calculated by counting the number of rescheduled appointments as missed appointments. Those who missed one or more appointments were grouped against those who kept all their appointments. A third group that was also found included those who never even agreed to make an appointment with a doctor in the first place. These clients were included with those who missed one or more appointments in order to increase the significance of the results. These results were also interpreted with a bar graph.

3. Results

Table 1 shows a few baseline statistics of the population at New Beginnings. All the subjects of the study were above the age of 21 and a large majority was male. The average CD4 count entering into the program was 208.4 cells/mm³, well below the normal value ranges. Overall, a slight increase in the CD4 count was observed from initial counts to the second count.

A breakdown was done to more clearly observe the changes in CD4 for subjects during their stay at New Beginnings. The figure above shows that the largest interval of subjects was the 0–100 group. Additionally, it could be observed that most of the population exhibited increases in their counts. In order to break down these changes by interventions, attendance rates for doctor’s appointments and group counseling as well as ARV drug therapy status was studied (Fig. 1).

Fig. 2 shows the average CD4 cell count change for two groups. One group represents the clients who attended less than .25 groups daily or in other words less than one group every 4 days. This group exhibited an average decrease of about 43. On the other hand, the group that attended .25 or more groups a day, or at least one group every 4 days, exhibited an average increase of 19.

Fig. 3 shows a breakdown of the subjects of the study in terms of their ARV drug therapy status. It was found that the majority of those entering the program were already on ARV drug therapy. Almost one quarter never started therapy and eight percent started therapy once enrolled in the program. Next, the changes in CD4 for these groups were calculated.

Fig. 4 shows the breakdown of subjects based on their ARV drug therapy. The first group included those who never started therapy
and the other included those who either came into the program on therapy or started therapy while enrolled in the program. The group that never started therapy exhibited an average change of −4.00. The group that was on therapy had an average change of 12.67.

Fig. 5 shows the effect of the third intervention in the study. The first group included those who missed at least one doctor’s appointment. The second group was made up of those who never missed an appointment. Those who missed appointments averaged a change in CD4 count of −156. Those who never missed appointments averaged a change of +118.

4. Discussion

The study was conducted in order to find what interventions were most effective in improving the health of the clients of New Beginnings, all of whom were triply diagnosed homeless people from New York City. Utilizing a chart review for subjects ranging from 2008 to 2010, statistics on CD4 count, attendance rates for group counseling and doctor’s appointments, and ARV drug therapy status were logged and graphed. It was hypothesized that ARV drug therapy status would be the most influential marker of the subjects’ health.

The first relationship studied was that between the change in CD4 count and attendance at group counseling sessions. The results showed that those who attended at least one session every 4 days averaged an increase of 19 in their CD4 count and those who attended less averaged almost −44. Although these changes did not seem overwhelmingly significant, it was certainly noteworthy that a lower attendance rate was associated with a negative trend in CD4 count.

The next intervention studied was ARV drug therapy. As seen in Fig. 3, it can be observed that a large majority of subjects entered the New Beginnings program already on ARV therapy. Some never agreed to start the therapy and even less started after entering the program. It was expected that ARV therapy would have the most direct effect on the CD4 counts of the subjects. However, the difference between the average change in CD4 for those on treatment and those without it was very small. The average change for those on ARV therapy was almost +13. Those not on any therapy showed an average change of −4. The ARV therapy group did exhibit a positive change, but not significant.

The last intervention was facilitation of access to primary care. The attendance record for doctors’ appointments of each subject was looked up and compared with the change in CD4 count. We can see in Fig. 5 that this was the intervention with the biggest effect on CD4 count. Those who honored all their appointments showed an average increase of +119, while those who missed appointments averaged a drop of 156. This is by far the largest change observed in the study. It is notable also that not only was taking part in this intervention effective, but the lack of it resulted in an even larger decrease in CD4. Therefore, the results of this study pointed towards primary care access as the most effective of the three interventions tested.

It was surprising to see that ARV drug therapy was not as strongly associated with better CD4 counts than the other interventions. However, the large positive change in CD4 seen in those who kept all their doctor’s appointments was not hard to explain. Subjects who took the time and made the effort to keep their doctor’s appointments were also more likely to be on track with their medications and take better care for themselves. This is what probably resulted in the large positive change for this cohort. Those who were listed as being in ARV drug therapy in this study were once prescribed ARV drugs, but this did not mean they adhered to the regimen well at all. A better way to test ARV drug therapy would be to ask in terms of level of adherence to the regimen. As far as group counseling sessions, the group with higher attendance showed a modest gain in CD4 while those with a lower attendance showed a pretty significant drop. This was probably similar to what happened with doctor’s appointments. Those who attended more groups were probably more proactive in keeping up their own health. To miss group counseling sessions that were conducted in the same building and required no travel probably reflected the lack of motivation to improve one’s health.

This study was met with many limitations. The sample size was rather small (n = 29) because it was difficult to find subjects with charts that included every aspect of the study. Therefore, a small number of extreme results could have thrown off the average statistics of the subjects. Since this study was a retrospective one, many of the methods were difficult to control. For example, all of the blood tests for the CD4 counts were done at different clinics and sent to different labs for analysis. Although CD4 cell count was always measured in the same units, a difference in technique or analysis may have thrown off the results. Each subject had two blood tests done, one for a baseline measure of CD4 and a second to see the effect of the intervention. At least 1 month was spent in the program before the second blood test was conducted. However, some clients waited two or 3 months before taking their second blood test. This may have affected the results in that these subjects spent more time undergoing the interventions, resulting in either a more negative or positive result. In a future studies, more accurate and reliable results would be achieved by making sure all clients took blood tests at the same place and waited the same amount of time before getting their second test. Additionally, the group counseling sessions were led by any of three different counselors. One
subject could have attended the same number of group sessions as another subject but could also have never attended a group led by the same counselor. Therefore, it was assumed that each counselor was equally effective, which could have affected the accuracy of the results.

In addition to the limitations of the methods, some of the data collection and interpretation could have been improved. The primary care status measures form was completed by conducting a survey with the subjects. Certain data entries required proof, such as CD4 count, but the question regarding ARV therapy status was based solely on the answer on the survey. It was entirely possible that clients could have given false information about this.

For future studies, the effectiveness of more interventions should be tested, such as referrals to drug rehabilitation centers or access to housing specialists. In addition, more health factors can be included to assess the condition of the clients such as HIV viral load. This study also did not take an in-depth look at the mental health and substance abuse behaviors of the subjects. These are two major factors in the co-morbidity of this specific population [15]. Finding the best combination of interventions that focuses on all the areas that affect this cohort will be helpful in making their quality of life much better.

5. Conclusion

A study was conducted in the form of a retrospective chart review in order to find out the most effective intervention for triply diagnosed AIDS subjects living in a transitional housing program. It was hypothesized that ARV therapy would be the most effective intervention because of its direct effects on the replication of the HIV virus. However, of three interventions studied, access to primary care was found to be the most effective in increasing the CD4 counts of the subjects.

Conflict of interest

There were no conflicts of interest as a part of this study.

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