

## HIV/NCD comorbidity in sub-Saharan Africa: the need for a synergistic health care model

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### **ABSTRACT**

Our aim is to assess missed opportunities of HIV/NCD (non-communicable disease) testing among older South Africans. A pilot study, using the Testing & Risk History Calendar, with 30 participants (aged 50-plus, 7 HIV-positive/23 HIV-negative) was conducted in two sites in South Africa. We calculate the prevalence of self-reported comorbidities, and the frequency of HIV and/or NCD screening. Overall, over half of the sample had high blood pressure, and another 20% had diabetes; about 15% reported both. Despite extensive NCD care engagement, the majority of HIV testing was for those who reported being HIV-positive. HIV tests were generally provider initiated due to the patient showing HIV symptoms, rather than part of routine care. Routine testing opportunities for early HIV detection are not occurring among older adults. A synergistic, preventative health care model that encourages routine testing for HIV and NCDs concurrently would benefit the health of older South Africans.

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### **Introduction**

High levels of HIV infection and the successful utilization of anti-retroviral treatment (ART) in South Africa has led to aging of the population of people living with HIV (PLHIV), creating to new issues surrounding the testing and care of PLHIV as HIV and the aging process increases susceptibility for non-communicable disease (NCD)<sup>16,19</sup>. Therefore, special attention is needed around both testing and treatment of HIV and NCD at older ages. Early testing and treatment of both HIV and NCDs are crucial<sup>17</sup>. Early HIV testing in the age of Universal Test and Treat (UTT) means early initiation on ART, initiation while CD4+ counts are high leads to better health outcomes than when the medication is implemented later in the course of the disease when CD4+ counts are lower<sup>2,12</sup>. Frequent and routine testing of all older adults (those outside of the age range of reproductive health services, i.e., aged 50-plus) would enable early utilization of ART; further early detection has a prevention mechanism as well, as when patients receive early ART intervention the number of new infections throughout the community decreases<sup>14</sup>.

Frequent and routine testing for HIV not only create more positive health outcomes for individuals and curb transmission, but they also result in a variety of other benefits: individuals being more knowledgeable of HIV prevention, transmission, and treatment; individuals partaking in less risky sexual behaviors; reduced risk of transmission; and decreased HIV stigma<sup>10</sup>. Frequent testing and early treatment of NCDs is also vital for the proper healthcare and the health and wellbeing of older South Africans, as 60% of global deaths are a result of

NCDs; three-quarters of these deaths occur in low or middle income countries (LMICs). In South Africa, NCD-related deaths are also proportionally higher in disadvantaged groups, such as PLHIV<sup>6,7</sup>. Preventative early treatment interventions for NCDs through early detection via frequent screening is necessary to address the increasing burden of NCDs by engaging older adults on treatment to slow or stop the bodily damage that NCDs cause, thus minimizing long term damage<sup>4,7</sup>.

Since there is no cure for HIV, health care providers must address holistically the effects that HIV has on overall health, as HIV increases individuals' vulnerability to other conditions, such as NCDs<sup>19</sup>. Even when HIV is properly treated, high rates of comorbidities threaten long-term health and survival as the mortality rate of PLHIV is fifteen times higher than those who do not have HIV. Half of the deaths of PLHIV are a result of HIV comorbidity with NCDs, highlighting the need for integrated treatment for HIV and NCDs to achieve proper healthcare for PLHIV<sup>17,9</sup>. HIV accelerates the aging process, as that those who are younger on ART have higher rates of NCDs that typically are more prevalent in older individuals<sup>18</sup>. Correct utilization of ART can decrease susceptibility to NCDs, but the rate of NCDs is still higher among those who are on ART than those who do not have HIV at all, which is a result of the linkage of ART to obesity, diabetes, hypertension, and metabolic syndrome; HIV is a major risk factor for NCDs<sup>18,16,19</sup>. This article assesses the reported timing of older South Africans' HIV and NCD diagnoses to assess coverage of testing and missed opportunities for each non-communicable disease (NCD) and HIV testing among older South Africans.

## **METHODS**

A pilot study used a Testing and Risk History Calendar (TRHC) with accompanying survey questions on older adults' last 4 HIV tests to collect data on 30 South Africans aged 50-plus. The pilot was conducted in one urban (Khayelitsha near Cape Town, N=18) and one rural (Agincourt, N=12) site. The TRHC collected 10 years of retrospective data on socio-demographic information, HIV testing, and health (See Schatz et al. 2019 for additional details on instrument and study design). The TRHC was beneficial in accomplishing three goals: (1) providing reference points in order to place events throughout a ten-year timeline; (2) accurate HIV testing dates throughout the ten-year period; and (3) details of what else happened throughout the ten-year period in order to contextualize the HIV testing. Thus, the TRHC has the potential to connect HIV testing and broader health in older ages.

### *Utilizing the TRHC to Create a Format for Comparison of HIV and NCD Occurrence*

One of the many details the TRHC analyzes within the participant's HIV testing context was the interrelation between HIV testing and NCD's. The full TRHC's were originally taken by two interviewers on site. The handwritten hard copies of the TRHC included forty-two different aspects of the participant's lifestyle between May 2008 and July 2018 (insert figure of the full TRHC). In order to focus on the correlation between HIV and NCD's specifically, an abbreviated digitized form of the TRHC was created using Microsoft Excel which only included HIV testing

history and NCD history of the patient over the past ten years (insert figure of abbreviated TRHC).

### *Comparing Events through Alignment on Timeline*

The abbreviated, digitized TRHC's were then analyzed through comparing when events lined up throughout the participant's timeline. The calendar format allowed for a full understanding of events correlating with each other throughout the context of time. The abbreviated TRHC allowed for comparison of when HIV testing and NCD diagnoses happened in relationship to one another. Therefore, observations could be made as to whether the events were correlated or not. This comparison creates an understanding of the relationship between the screening of HIV and NCD's in a health care setting, as the literature tells that HIV and NCD prevalence are highly interrelated<sup>17</sup>.

### *Separation into Groups for Analysis*

The analysis was split into two groups, one that included participants who did not have HIV and a secondary group that included only the participants who were HIV positive.

The first group, which included twenty-three participants was analyzed with specific goals for a focused analysis. The first focus was to look at whether tests for HIV and NCD's would have been done more frequently if done at the same time; determining whether the health care system should begin to recommend simultaneous screenings for both HIV and NCD's in order to create more frequent opportunities for testing for both HIV and NCD's leads to better health outcomes<sup>12,7</sup>. The second focus was whether or not the individual would have been screened earlier if these tests would have been done at the same time, as the literature discusses early treatment for both HIV and NCD's leads to more beneficial outcomes<sup>12,7</sup>. The third focus was on the prevalence of NCD's in the HIV negative population, creating the basis of comparison as to whether NCD prevalence is higher in HIV positive or negative populations and how the prevalence differs between the two groups.

The second group, consisting of seven individuals living with HIV, was also analyzed with three focused goals. The first was whether they were tested for NCD's at the same time as their HIV positive test; since the literature shows high comorbidity between HIV and NCD's, if the NCD tests are not being implemented at the time of the positive HIV tests this provides a starting point in order to create more opportunities for testing. The second focus provides data as to which NCD's were most prevalent in the HIV positive population, providing a secondary point of comparison to the NCD prevalence between HIV positive and negative populations. The third goal focuses on why these participants underwent their HIV tests; this analysis was performed by looking at the initial surveys in order to utilize existing motivations for testing to encourage more frequent HIV testing.

## **RESULTS**

The first group analyzed HIV negative participants yielded data regarding testing for HIV and NCD's at the same time as 43.5% of HIV negative participants would have been tested more frequently for HIV if they had been tested at the same time they were diagnosed with their NCD and 78.3% of HIV negative participants were not screened for NCD's, yielding a positive result when they tested for HIV. The next focus for this group yielded a result that 44.4% of participants in the HIV negative group would have been tested for the NCD they were later diagnosed with at an earlier time if they had been screened for the NCD when they were tested for HIV. The third focus for this group presented that 56.5% of HIV negative individuals were living with high blood pressure, 17.4% were living with diabetes, and 8.7% were living with both high blood pressure and diabetes.

The second group consisting of participants who were HIV positive showed that 85.7% were not tested for NCD's yielding a positive result at the same time as their positive HIV test. The analysis also shows the prevalence of various NCD's in the HIV positive population where 71.4% of participants living with HIV were living with high blood pressure, 42.9% were living with diabetes, and 42.9% were living with both high blood pressure and diabetes. The last focus utilized the surveys to determine why participants underwent HIV testing. 85.7% of participants living with HIV tested as a result of provider recommendation where 83.3% of those recommendations were a result of the patient showing symptoms of HIV and only 16.7% of those recommendations were a result of preventative health care by the health care provider.

## **DISCUSSION**

The presented data along with the literature review conducted has led to the conclusion that a synergistic healthcare model would greatly benefit South Africa in combatting HIV and NCD's high comorbidity and mortality rate, where the clinic or other healthcare establishment provides care for all diseases, not simply just one specific disease as currently in South Africa, in order to get care for HIV, one has to go to the HIV clinic which successfully hampered the massive outbreak of HIV, but is no longer sufficient as individuals living with HIV continue to age and begin to develop multiple comorbidities, specifically with NCD's<sup>15,3,19</sup>. The results of this data collection process led to a variety of findings which represent benefits and recommendations in order to properly enact a synergistic health care model.

### *Increasing Frequency of HIV Testing through Preventative Care*

The data shows that many participants would have tested more frequently for HIV if they had been tested at the same time as their positive NCD screening. The literature provides convincing data to support that frequent testing for HIV has a vast number of benefits that support both the individual patient and the community as a whole, such as decreasing the spread of the disease, raising knowledge of the disease and transmission, and promoting overall health through early treatment<sup>10</sup>. Therefore, physicians should begin to recommend HIV testing as a part of routine healthcare, since individuals in the community are seeking out

healthcare for other conditions, this provides an excellent point of contact with the community to encourage frequent testing.

### *HIV and NCD Comorbidity*

The data presents high correlation between being HIV positive and having hypertension, diabetes, or both which the literature explains as HIV raises one's susceptibility to these non-communicable diseases, therefore the issue of this high comorbidity between HIV and NCD's must be addressed<sup>19</sup>(*Insert figure to represent this data*). The fact that HIV is a major risk factor for developing NCD's can be addressed through administering frequent testing and screening to detect both HIV and NCD's early in order to begin treatment before the diseases wreak havoc on the body<sup>1,15</sup>. Therefore, a synergistic care model which combines the treatment of HIV and NCD's into a preventative health care setting can be useful in this scenario in South Africa. In order to begin the synergistic care model, it would be important to begin where the most people would benefit. The data from the TRHC's show that high blood pressure and diabetes are the most prevalent comorbidities with HIV. Healthcare providers should begin by recommending HIV testing and NCD screening together as a part of routine healthcare. When an individual is positively diagnosed with HIV, the physician should strongly recommend that they screen for NCD's, specifically high blood pressure and diabetes. Integrating HIV and NCD screening into the preventative health care setting will create more frequent testing, promoting the health of the population as diseases will be diagnosed and treated sooner.

### *HIV and NCD Provider Initiated Preventative Testing*

Throughout the literature, there is a variety of benefits for testing frequently for HIV and NCD's, however most of the individuals in this study were not testing frequently, as the data shows that individuals' main reason for testing for HIV was as a result of provider initiation, and that these providers were recommending testing because the patient was showing symptoms of HIV<sup>10,4</sup>(*Insert figure to represent this data*). As the synergistic health care model continues, it would be an ideal goal for the healthcare system to adopt the practice of every time an individual went to see a physician, they were getting tested or at least recommended to be tested for HIV and screened for NCD's. This would help curb transmission rates of HIV throughout the population of South Africa, specifically among the elderly population as they have very little knowledge of transmission of HIV and practice risky sexual behaviors<sup>10</sup>. This would also help stop the global burden of NCD's, specifically in LMIC's like South Africa, as early diagnosis will decrease the detrimental effects that the diseases have on the body, causing less of an impact on the health care system as a whole since early treatment decreases the severity of the case<sup>2</sup>.

### *Limitations*

Our findings had several limitations. First, there has been very limited research done regarding the implementation of synergistic care models in LMIC's, thus more research must be done on the topic in order to gain a complete understanding as to how this can successfully be

implemented in a country such as South Africa. Second, there were a limited number of participants in this study, in order that a large amount of information could be collected on each individual. For further research, a more expansive study is necessary in order to interview many more individuals to gain a more comprehensive understanding; using the abbreviated TRHC in order to specifically study the relationship between HIV and NCD's will allow for more individuals to be interviewed. Third, the TRHC only considered NCD tests which yielded a positive result; in order to understand how often these individuals are being screened the participant should be questioned about every time they were screened for an NCD in the past ten years, not only when they were positively diagnosed. These limitations only allow for a narrow scope to look at the pressing issue of how to properly address HIV's high comorbidity rate with NCD's, allowing for further and more expansive research in this area of study.

## CONCLUSION

The integration of HIV and NCD's into a synergistic care model into routine health care in South Africa provides proper care by promoting more frequent screening of HIV and NCD's throughout the whole South African population. The proper adaptation of this model into preventative healthcare is essential for curbing transmission and enhancing the quality of life of those living with HIV. This synergistic, preventative health care model will help provide holistic and proper care for all individuals in South Africa, especially for those living with NCD's.

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