Where are the deficiencies in care?

***Aim:***

*What is the contribution of each stage of care on overall DALYs / mortality?*

*The interventions we have designed to intervene along HIV care may have an attentuated impact due to upstream / downstream weaknesses in care. For example, we have a powerful ART Outreach intervention that brings back 100% of people lost from care, yet it doesn’t have a huge impact on DALYs averted in the model, this is due to the small proportion of individuals that ever initiate ART due to upstream leaks in care at baseline. I want to understand how important each “stage” of care is, by making care “perfect” and then systematically walking through each stage and “weakening” it (using the baseline values from AMPATH), while keeping all other aspects of care perfect to visualise the impact on DALYs and mortality.*

**Method:**

1. *Create a “perfect care” scenario, in which everyone, upon getting infected, immediately gets tested, linked, retained in pre-ART care and initiates ART as soon as they become eligible, all adhere to ART and there is zero dropout.*
2. *In the absence of interventions, test the contribution of each “stage” of care on DALYs accrued and mortality. For example, for testing pre-ART retention: set pre-ART retention parameters to “baseline” levels, allow care upstream and downstream to be perfect.*
3. *Test the impact of our interventions on each “stage” of care on DALYs accrued and mortality. For example, again for testing pre-ART retention: with pre-ART retention parameters at “baseline” levels (care upstream and downtream perfect), test the impact of the pre-ART outreach intervention on reducing DALYs accrued and mortality.*

# Results

***“Perfect Care”***

17m DALYs accrued between 2010 and 2030.

*This scenario was created by doing the following:*

* Individuals get an HIV-test the very day they become infected (if time >= 2004, when testing starts, else on the 1st of January 2004)
* The mean times to seeking care through VCT / PICT are set to baseline levels, so people seek care normally (but everyone seeks care once, as soon as they become infected or on the 1st january 2004 if infection is prior to 2004).
* All tested individuals are linked to care.
* Once linked, all individuals receive a CD4 test, none are lost from care
* Receive the CD4 test result the very next day (on average).
* If not eligible, the follow-up test is the next day. (PICT / VCT rates are competing here so everyone is seeking care all the time).
* If eligible, start ART the next day.
* 100% adherence to ART
* 0% dropout from ART.

This scenario was created in an attempt to understand “if HIV care is perfect, no leaks, immediate testing and treatment, whats the cost in terms of DALYs accrued and mortality?”

**Contribution of each stage of care to DALYs accrued and mortality**

Starting with our “perfect care” scenario, I split care into 5 discrete stages:

***Normal HIV-Testing*** *–* all care downstream is perfect but HIV-testing rates are set to baseline levels.

***Normal Linkage*** *–* HIV-testing is perfect, linkage is set to baseline levels and all care downstream is perfect

***Normal Pre-ART Retention*** *–* HIV-testing and linkage is perfect, pre-ART retention levels are set to baseline with ART retention and adherence perfect

***Normal ART Retention*** *–* HIV-testing, linkage and pre-ART retention are perfect, ART adherence is perfect too but patients can dropout of ART care.

***Normal ART Adherence*** *–* HIV-testing, linkage, pre-ART and ART retention are perfect but adherence to ART is set to baseline levels.

I first look at impact in terms of DALYs, by subtracting the DALYs that accrue between 2010 and 2030 in the “perfect care” scenario from the DALYs that accrue when I test each of the 5 stages, I arrive at the “additional DALYs that accrue due to imperfect care between 2010 and 2030” for each stage. The results are shown in the black bars on figure 1. The longer the bar, the more detrimental the impact a particular stage has on care.

These results (in constrast to the previous figures produced when I set the time to seeking care through VCT/PICT to 1 day), show the same deficiencies in care as our main model results. That is, HIV-testing and pre-ART retention are suboptimal.

The taller the black bar (baseline) the more detrimental a particular stage of care, as it results in the accumulation of more DALYs in comparison to “perfect care” over the 20 year period. The bars representing our interventions then illustrate the impact our interventions have on reducing the DALY’s that accumulate at baseline for each stage of care.

As was seen in the previous version of this document, if care is perfect but individuals are allowed to be lost from ART care, we see that ~6m DALYs accumulate over the 20 year period; however, if the ART Outreach intervention is implemented DALYs can be reduced by 2/3rds, illustrating that the ART Outreach intervention would be highly impactful if it weren’t for upstream losses in care resulting in a small proportion of individuals ever initiating ART at baseline.

**Mortality (figure 2)**

The small proportion of individuals who suffer an HIV-related death before initiating ART in the ‘perfect care’ scenario are individuals who died from HIV prior to becoming eligible for treatment.

The same story is reflected in the mortality plot (figure 2) as in figure 1, whereby in comparison to perfect care, the largest single weaknesses in care are from suboptimal HIV-testing and pre-ART retention. Also shown is the reduction in mortality brought about by the ART-Outreach intervention compared to the baseline scenario of ART retention.

jjo11:cascade:CareCascadeV2:2015:January:7th:Leaks:plots:mortalityDueToImperfectCare.pdfjjo11:cascade:CareCascadeV2:2015:January:7th:Leaks:plots:additionalDalysDueToImperfectCare.pdf

Figure 2.

Figure 1.