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Clinical outcomes after first-line HIV treatment failure in South Africa: the next cascade of care

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Supplementary Table 1. Proportion of individuals aged ≥15 years with viral load monitoring, and with optimal monitoring, during first 12m and 24m on ART, by clinic[1]

Clinic of ART initiation	N starting ART[1]	n with VL at 6m / N on ART[2] (%)	n with VL at 12m / N on ART[3] (%)	n with VL at 24m / N on ART[4] (%)	N (%) with optimal monitoring to 12m[5]	N (%) with optimal monitoring to 24m[6]
Clinic 1	1515	575 / 1313 (43.8%)	459 / 1245 (36.9%)	290 / 979 (29.6%)	120 (9.6 %)	36 (3.7 %)
Clinic 2	1354	564 / 1117 (50.5%)	531 / 1060 (50.1%)	265 / 854 (31.0%)	280 (26.4%)	45 (5.3 %)
Clinic 3	1060	318 / 904 (35.2%)	266 / 844 (31.5%)	150 / 658 (22.8%)	80 (9.5 %)	10 (1.5 %)
Clinic 4	803	145 / 681 (21.3%)	228 / 648 (35.2%)	105 / 472 (22.2%)	39 (6.0 %)	6 (1.3 %)
Clinic 5	239	92 / 206 (44.7%)	96 / 193 (49.7%)	57 / 154 (37.0%)	40 (20.7%)	11 (7.1 %)
Clinic 6	1072	231 / 898 (25.7%)	288 / 850 (33.9%)	130 / 623 (20.9%)	33 (3.9 %)	3 (0.5 %)
Clinic 7	627	278 / 489 (56.9%)	190 / 463 (41.0%)	114 / 349 (32.7%)	94 (20.3%)	29 (8.3 %)
Clinic 8	5157	1619 / 4141 (39.1%)	1269 / 3918 (32.4%)	717 / 3035 (23.6%)	445 (11.4%)	192 (6.3 %)
Clinic 9	681	340 / 577 (58.9%)	125 / 554 (22.6%)	83 / 438 (18.9%)	46 (8.3 %)	12 (2.7 %)
Clinic 10	1102	311 / 921 (33.8%)	252 / 870 (29.0%)	121 / 666 (18.2%)	60 (6.9 %)	3 (0.5 %)
Clinic 11	1570	653 / 1332 (49.0%)	422 / 1256 (33.6%)	267 / 926 (28.8%)	136 (10.8%)	23 (2.5 %)
Clinic 12	3851	1233 / 3474 (35.5%)	866 / 3298 (26.3%)	475 / 2386 (19.9%)	176 (5.3 %)	33 (1.4 %)
Clinic 13	1871	460 / 1542 (29.8%)	362 / 1449 (25.0%)	245 / 1117 (21.9%)	39 (2.7 %)	6 (0.5 %)
Clinic 14	493	245 / 396 (61.9%)	204 / 375 (54.4%)	142 / 308 (46.1%)	127 (33.9%)	55 (17.9%)
Clinic 15	2084	982 / 1755 (56.0%)	853 / 1669 (51.1%)	415 / 1282 (32.4%)	482 (28.9%)	169 (13.2%)
Clinic 16	1779	809 / 1537 (52.6%)	664 / 1467 (45.3%)	404 / 1097 (36.8%)	355 (24.2%)	114 (10.4%)
Clinic 17	1113	408 / 917 (44.5%)	310 / 851 (36.4%)	150 / 355 (42.3%)	82 (9.6 %)	16 (4.5 %)
Total	**26,371**	**9263/22,200 (41.7%)**	**7385/21,010 (35.1%)**	**4130/15,699 (26.3%)**	**2634 (12.5%)**	**1024 (6.5 %)**

[1]Excludes 3013 patients initiated on ART at the hospital rather than clinics. [2]Viral load measurement done between >20 weeks to 9 months after ART start. Denominator is individuals who have been on ART at least 9m. [3]Viral load measurement done between >9 months to 15 months after ART start. Denominator is individuals who have been on ART at least 15m. [4]Viral load measurement done between >21 months to 27 months after ART start. Denominator is individuals who have been on ART at least 27m. Excludes individuals who started ART in 2016. [5]Optimal monitoring during first 12m is defined as a viral load measurement at 6 months and 12 months after ART initiation, using the windows in footnotes 1 and 2. Denominator is individuals who have been on ART at least 15 months. [6]Optimal monitoring during the first 24m is defined as a viral load measurement at 6m, 12m and 24m after ART initiation, using windows in footnotes 2, 3 and 4. Denominator is individuals who have been on ART at least 27 months.

Supplementary table 2. Proportion of individuals aged ≥15 years with viral load monitoring, and with optimal monitoring, during first 12m and 24m on ART, among those who have been continuously in care without interruption

Year of ART initiation	N starting ART	N continuously in care for 12m (% of those started) [1]	N continuously in care for 24 months (% of those started) [1]	n with VL at 12m[2] (%)	n with VL at 24m[3] (%)	N (%) with optimal monitoring to 12m[4]	N (%) with optimal monitoring to 24m[4]
2010	3177	2090 (65.8%)	1812 (57.0%)	811 (38.8%)	751 (41.4%)	341 (16.3%)	203 (11.2%)
2011	3543	2517 (71.0%)	2089 (59.0%)	955 (37.9%)	678 (32.5%)	358 (14.2%)	142 (6.8 %)
2012	4040	2765 (68.4%)	2283 (56.5%)	897 (32.4%)	722 (31.6%)	314 (11.4%)	135 (5.9 %)
2013	3642	1955 (53.7%)	1478 (40.6%)	672 (34.4%)	546 (36.9%)	194 (9.9 %)	87 (5.9 %)
2014	3988	2091 (52.4%)	1487 (37.3%)	822 (39.3%)	408 (27.4%)	211 (10.1%)	61 (4.1 %)
2015	5556	3053 (54.9%)	2095 (37.7%)	1062 (34.8%)	289 (13.8%)	429 (14.1%)	65 (3.1 %)
2016	5438	2842 (52.3%)	–	1307 (46.0%)	–	568 (20.0%)	–
Total	**29,384**	**17,313 (58.9%)**	**11,244 (38.3%)**	**6526 (37.7%)**	**3394 (30.2%)**	**2415 (13.9%)**	**693 (6.2 %)**

[1]Individuals who have been attending clinic at all scheduled visits for at least 15m, or at least 27m (to allow for +3m window). [2]Viral load measurement done between >9 months to 15 months after ART start. Denominator is individuals who have been continuously in care for at least 15m. [3]Viral load measurement done between >21 months to 27 months after ART start. Denominator is individuals who have been on ART at least 27m. [4]Optimal monitoring during first 12m is defined as a viral load measurement at 6 months and 12 months after ART initiation, using a + / -3m window at each time-point. Denominator is individuals who have been on ART at least 15 months. [5]Optimal monitoring during the first 24m is defined as a viral load measurement at 6m, 12m and 24m after ART initiation, using a + / -3m window at each time-point. Denominator is individuals who have been on ART at least 27 months.

Supplementary Table 3. Proportion of individuals aged ≥15 years starting ART in each year, and still in care at 6, 12 and 24 months

Year of ART initiation	N starting ART	N still in care at 6m (%) [1]	N still in care at 12m (%) [1]	N still in care at 24 m (%) [1]
2010	3177	2495 (78.5%)	2354 (74.1%)	2150 (67.7%)
2011	3543	2961 (83.6%)	2823 (79.7%)	2597 (73.3%)
2012	4040	3406 (84.3%)	3235 (80.1%)	2993 (74.1%)
2013	3642	2897 (79.5%)	2741 (75.3%)	2523 (69.3%)
2014	3988	3231 (81.0%)	3045 (76.4%)	2740 (68.7%)
2015	5556	4695 (84.5%)	4428 (79.7%)	3962 (71.3%)
2016	5438	4514 (83.0%)	4181 (76.9%)	–
Total	**29,384**	**24,199 (82.4%)**	**22,807 (77.6%)**	**16,965 (70.8%) [2]**

[1]Individuals who are attending the clinic (with or without interruptions in care) for at least 9m, 15m or 27m. [2]Among 23,946 individuals starting ART from 2010-2015

Supplementary Table 4. Individuals aged ≥15 years with viral load ≥1000, and proportion with repeat test in 6 or 12 months, among individuals starting ART in 2010-2016

Year of ART initiation	N with any VL test[1]	N (%) with VL ≥1000[2]	N (%) with repeat test in 6m[3]	N (%) with VL ≥1000 on repeat test[4]	N (%) switched to second line[5]	Median (IQR) days to switch	Switched or VL <1000 on repeat test[4]
2010	2328	433 (18.6%)	142 (32.8%)	96 (67.6%)	50 (52.1%)	526 (246-1004)	96 (67.6%)
2011	2754	398 (14.5%)	121 (30.4%)	78 (64.5%)	38 (48.7%)	221.5 (100-567)	81 (66.9%)
2012	3037	383 (12.6%)	102 (26.6%)	68 (66.7%)	24 (35.3%)	247.5 (99.5-500.5)	58 (56.9%)
2013	2279	264 (11.6%)	56 (21.2%)	29 (51.8%)	6 (20.7%)	148.5 (93-963)	33 (58.9%)
2014	2298	231 (10.1%)	76 (32.9%)	43 (56.6%)	12 (27.9%)	520 (204-709.5)	45 (59.2%)
2015	3334	201 (6.0 %)	74 (36.8%)	41 (55.4%)	8 (19.5%)	102.5 (43.5-324.5)	41 (55.4%)
2016	3552	225 (6.3 %)	87 (38.7%)	53 (60.9%)	3 (5.7 %)	338 (283-363)	37 (42.5%)
Total	**19,582**	**2135 (10.9%)**	**658 (30.8%)**	**408 (62.0%)**	**141 (34.6%)**	**338 (135-713)**	**391 (59.4%)**

[1]Viral load measurement done at any point >20 weeks after ART start. [2]Among individuals with at least one VL test >20 weeks after ART start. [3]Repeat viral load done between 10-30 weeks after VL ≥1000, among those with VL measurement ≥1000. [4]Among those with repeat test in 10-30 weeks. [5]Among those with repeat VL ≥1000.

Supplementary Table 5. Factors associated with success in the first line cascade, among 2135 individuals aged ≥15 years with a viral load ≥1000 copies/mL

	n success / N(%)[1]	Crude odds ratio (95% CI)	Adjusted odds ratio (95%CI) [2]
Age at VL ≥1000[3]		P=0.39[4]	P=0.14[4]
15-24 years	78 / 365 (21.4%)	1.22 (0.91 -1.62)	1.34 (0.99 -1.83)
25-34 years	162 / 937 (17.3%)	1	1
35-44 years	87 / 534 (16.3%)	0.89 (0.73 -1.07)	0.84 (0.68 -1.03)
≥45 years	64 / 299 (21.4%)	0.94 (0.75 -1.17)	0.91 (0.71 -1.16)
Sex		P=0.008	P=0.11
Male	116 / 757 (15.3%)	1	1
Female	275 / 1378 (20.0%)	1.38 (1.09 -1.75)	1.23 (0.95 -1.60)
Duration on ART[3]		P<0.001[5]	P<0.001[5]
< 2 years	17 / 299 (5.7 %)	0.77 (0.66 -0.90)	0.78 (0.67 -0.90)
2 - <5 years	141 / 876 (16.1%)	1	1
5 - <7 years	92 / 489 (18.8%)	2.05 (1.53 -2.76)	2.05 (1.52 -2.75)
≥7 years	141 / 471 (29.9%)	2.99 (2.25 -3.98)	3.06 (2.28 -4.09)
ART regimen when failing		P=0.59	P=0.91
TDF, FTC, EFV	194 / 1131 (17.2%)	1	1
TDF, EFV, 3TC	114 / 601 (19.0%)	1.13 (0.88 -1.46)	0.87 (0.66 -1.14)
ABC, EFV, 3TC	3 / 24 (12.5%)	0.69 (0.20 -2.34)	0.67 (0.19 -2.34)
AZT, EFV, 3TC	6 / 30 (20.0%)	1.21 (0.49 -2.99)	1.07 (0.42 -2.74)
Other	3 / 14 (21.4%)	1.32 (0.36 -4.77)	1.05 (0.28 -3.92)
Unknown	71 / 335 (21.2%)	1.30 (0.96 -1.76)	0.99 (0.71 -1.37)

[1]Success defined as repeat measurement within 6 months, and viral load <1000 on repeat testing, or switch to appropriate second line therapy. Denominator is all individuals with a viral load ≥1000. [2]Adjusted for age, sex, duration on ART and ART regimen when failing. [3]Continuous covariates (age and duration on ART) modelled by restricted cubic splines with 3 knots; n (%) success in each age group shown for information only. [4]Odds ratios are presented at selected values of age, comparing the minimum value in each age group to age 25 as the reference. [5]Odds ratios presented at selected values of time on ART, comparing the minimum value in each group to 2 years as the reference.