Improved Tuberculosis Treatment Outcomes at Facilities with an NGO-enhanced Antiretroviral Therapy Programme, Western Cape, South Africa

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ABSTRACT

BACKGROUND: The Western Cape, South Africa has one of the highest burdens of tuberculosis (TB) in the world, with 70% of TB patients co-infected with HIV. Absolute Return for Kids (ARK) is an NGO that assists the South African department of health (DOH) in increasing access to ART, primarily by providing clinical and adherence support staff for the ART program. This study aimed to compare TB treatment outcomes between facilities in the Western Cape that had ART services enhanced by ARK, and facilities that were not enhanced by ARK or had no ART service. Additionally, outcomes for the periods before and after ARK entry to facilities were compared.

METHODS: A retrospective analysis of routine DOH data from 2004 to 2007 was performed, including using multivariable maximum-likelihood logit estimates for grouped data.

RESULTS: 98 non ART-enhanced facilities treated 32 853 cases of smear-positive pulmonary TB, of whom 23 232 (70.7%; C.I. 70.2-71.2) were cured. Eleven ART-enhanced facilities treated 2822 cases, of whom 2222 (78.7%; CI: 77.2-80.2) were cured, amounting to a relative increase of 11.3% (CI: 9.1-13.6; P <0.0001). At non ART-enhanced facilities, 3685 patients (11.2%; CI: 10.9-11.6) defaulted treatment, while 181 (6.4%; CI: 5.5-7.4; P <0.0001) defaulted at ART-enhanced facilities, i.e. a relative decrease of 42.8% (CI: 33.9-50.5).

Prior to ART enhancement, 60.8% (CI: 59.2-62.5) of patients were cured, while 74.0% (CI: 71.6-76.3) were cured following ART enhancement, amounting to a relative increase of 21.6 % (CI: 16.7-26.7; P <0.0001). Prior to ART enhancement, 13.6% (CI: 12.4-14.9) patients defaulted treatment, and 9.5% (CI: 8.0-11.2) defaulted following ART enhancement, i.e. a relative decrease of 30.0% (CI: 15.9-41.8; P<0.0001).

Each additional 6-month period of ARK being present at a facility per calendar year was associated with a 23% lower risk of treatment failure (OR 0.77; CI: 0.73-0.81; P <0.0001) from 2004-2007, with a 44% reduced risk (OR 0.56; CI: 0.50–0.64; P<0.0001) in 2004. Similarly, the risk of defaulting treatment was reduced by 31% (OR 0.69; CI: 0.64-0.76; P<0.0001) from 2004-2007, with a 52% (OR 0.48; CI: 0.38–0.62; P <0.0001) reduced risk in 2004.

CONCLUSIONS: ART facilities enhanced by ARK had better TB treatment outcomes than non ART-enhanced facilities, treatment outcomes improved following ART enhancement, and the risks of poor outcome were lower for increased duration of ART enhancement. TB treatment outcomes are significantly improved with the scale-up of adherence supported ART services.

BACKGROUND

- In the Western Cape, South Africa, about 70% of TB patients have co-infection with HIV. During the past decade the incidence of TB has increased in parallel with the increasing prevalence of HIV. The Western Cape contributes over a third of registered multi-drug resistant TB cases in South Africa and improving TB treatment outcomes remains an ongoing challenge.
- Absolute Return for Kids, South Africa (ARK) is a non-governmental organisation that assists the Department of Health in the scale-up of the ART program, thereby reducing orphan hood by keeping carers alive. The focus of the program has been to increase access to ART through the provision of clinical teams, infrastructure, health management information systems and training.
- Concerns have recently been voiced on the theoretical negative effect of increased funding for specific health programmes on the overall impact of healthcare service delivery, with additional HIV-targeted funding creating islands of excellence in a sea of need. In contrast however, it may be considered that any targeted increase in professional personnel, infra-structure, enhancement of facility capacity and processes at the primary level of care may beneficially impact the broader health system, despite these having a programme-specific orientation.

OBJECTIVES

To evaluate the impact of ART services supported by ARK on a related service at the primary level of care, this study:

1. Compared TB treatment outcomes between facilities in the Western Cape that had ART services enhanced by ARK, and facilities that were not enhanced by ARK or had no ART service.
2. Compared TB treatment outcomes for the periods before and after entry by ARK to facilities.
3. Analysed the relationship between the duration of ARK's presence at a facility with poor TB treatment outcome.

METHODS

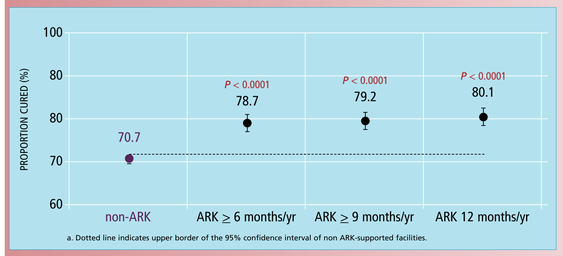
- Routine TB treatment outcome data were sourced from the Western Cape Provincial Department of Health, in which results were aggregated in calendar years for each treatment facility. TB treatment services at ARK-supported facilities were provided at either the same facility or immediately adjacent to the facility.
- Post-entry was defined as ARK being active for greater than six months in each calendar year after entry, and pre-entry was defined as ARK not being active or active for six months in the calendar year of first entry.
- Maximum-likelihood logit estimates for grouped data was used to analyse the relationship between poor outcome and the duration of time that ARK was present at a facility per calendar year, adjusting for the number of TB cases per facility.

RESULTS

1. ARK-supported vs. non ARK-supported facilities

- Data between 2004 and 2007 from 11 ARK-supported facilities and 98 non ARK-supported TB treatment facilities were analysed.
- Non ARK-supported facilities treated 32 853 cases of smear-positive pulmonary TB, of whom 23 232 (70.7%; 95 % C.I. 70.2– 71.2) were cured. Facilities that were supported by ARK for ≥ six months per calendar year treated 2822 cases, of whom 2222 (78.7%; 95% CI: 77.2–80.2) were cured, amounting to a relative increase of 11.3% (95% CI: 9.1–13.6; P < 0.0001), figure 1. Facilities that were supported by ARK for 12 months per calendar year showed a relative cure increase of 13.2% (95% CI: 10.6–15.9; P < 0.0001).

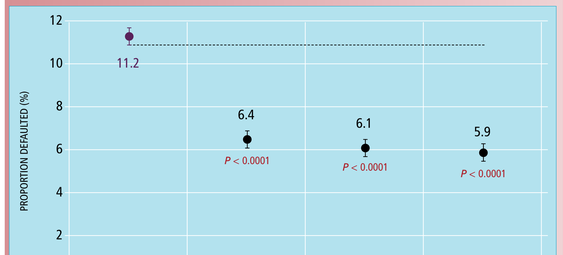
Figure 1: Proportions of smear-positive PTB cured, ARK and non ARK-supported facilities, for differing durations of ARK's presence at a facility. [a]



a. Dotted line indicates upper border of the 95% confidence interval of non ARK-supported facilities.

- At non-ARK supported facilities, 3685 patients (11.2%; 95% CI: 10.9–11.6) defaulted treatment, while 181 (6.4%; 95% CI: 5.5–7.4) patients at facilities that were supported by ARK for ≥ six months per calendar year defaulted treatment, amounting to a relative decrease of 42.8% (95% CI: 33.9–50.5; P < 0.0001), figure 2. Facilities that were supported by ARK for 12 months per calendar year showed a relative decrease of 47.6% (95% CI: 37.0–56.5), P < 0.0001) in the proportion defaulting.

Figure 2: Proportions smear-positive PTB defaulted, ARK and non ARK-supported facilities, for differing duration of ARK's presence at a facility. [a]

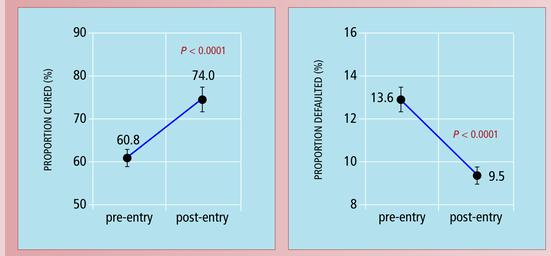


a. Dotted line indicates lower border of the 95% confidence interval of non ARK-supported facilities.

2. Pre- and post- ARK entry to facilities

- Seven facilities had available data to analyse outcomes prior to, and following ARK-entry to a facility.
- For the period prior to ARK-entry, 60.8% (95% CI: 59.2–62.5) of patients were cured, and 74.0% (95% CI: 71.6–76.3) were cured post ARK-entry, amounting to a relative increase of 21.6 % (95% CI: 16.7–26.7; P < 0.0001), figure 3.
- Prior to ARK entry, 13.6% (95% CI: 12.4–14.9) patients defaulted treatment, and 9.5% (95% CI: 8.0–11.2) defaulted post ARK-entry, producing a relative reduction of 30.0% (95% CI: 15.9–41.8; P < 0.0001).

Figure 3: Proportions of patients cured and defaulting TB treatment pre- and post-ARK entry



3. Duration of ARK's presence at a facility and poor TB treatment outcome

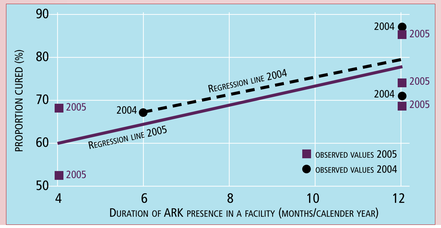
- Each additional six month period of ARK being present at a facility per calendar year was associated with a 23% lower risk of treatment failure (O.R. 0.77; 95% CI: 0.73–0.81; P < 0.0001) between 2004–2007; with a 44% reduced risk (O.R. 0.56; 95% C.I. 0.50–0.64; P < 0.0001) in 2004, table 1.
- Similarly, the risk of defaulting treatment was reduced by 31% (O.R. 0.69; 95% CI: 0.64-0.76; P <0.0001) between 2004–2007, with a 52% (O.R. 0.48; 95% C.I. 0.38–0.62; P < 0.0001) reduced risk in 2004.

Table 1: Risk of treatment failure or defaulting treatment per additional 6 month period of ARK's presence at a treatment facility/ calendar year. [a]

Year	TREATMENT FAILURE Odds ratio (95% C.I.)	TREATMENT FAILURE *P*-value	DEFAULTING TREATMENT Odds ratio (95% C.I.)	DEFAULTING TREATMENT *P*-value
2004	0.56 (0.50–0.64)	< 0.0001	0.48 (0.38–0.62)	< 0.0001
2005	0.70 (0.63–0.77)	< 0.0001	0.60 (0.51–0.71)	< 0.0001
2006	0.87 (0.80–0.95)	0.001	0.78 (0.69–0.89)	< 0.0001
2004-2007	0.77 (0.73–0.81)	< 0.0001	0.69 (0.64–0.76)	< 0.0001

a. Odds ratios are expressed as the risk of not being cured or defaulting treatment per additional six month period of ARK presence at a facility / calendar year.

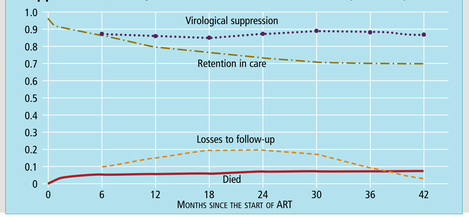
Figure 4: Observed proportions cured and fitted regression line of ARK-supported facilities according to the duration of time that ARK was present in a facility in 2004/05



CONCLUSIONS

- The Western Cape Department of Health TB treatment facilities supported by the ARK antiretroviral therapy program had a significantly higher proportion of patients cured and a lower proportion that defaulted TB treatment compared to facilities that were not supported by ARK. Treatment outcomes were significantly improved following ARK's entry to a facility, and the risks of poor outcome were significantly lower for increased duration of ARK's presence.
- The reasons for this, amongst others, may include:
  - TB patients are screened for HIV and visa versa, resulting in earlier diagnosis, referral and management.
  - TB patients receiving ART at ARK-supported sites receive group education, individual counseling, adherence support tools and community adherence psychosocial support as part of the comprehensive ART programme.
- The lessons learnt in improving adherence to ART are showing dividends in regards to improving TB treatment outcomes. This indicates that targeted HIV treatment programme improvement has a beneficial impact on the care of an associated disease such as TB.
- Further research is warranted to elucidate the component causes of this relationship and to assess the impact on non-infectious chronic disease programs such as those for hypertension and diabetes mellitus.

Figure 5: ARK ART program outcomes: Kaplan-Meier estimates of death and retention in care, proportions lost to follow-up and virological suppression for ART-naïve adults starting ART at ARK-supported facilities, November 2003 – March 2008 (n = 29 319)



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