



# Antiretroviral Coverage in Two Districts with and Without Performance-Based Finance from 2017 to 2019 in the Central African Republic

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## Abstract

**Background:** The Central African Republic has low ARV coverage for HIV testing with high mortality. Since 2012, it has opted for performance-based purchasing of HIV/AIDS services through a pilot project that will end in 2020 to address these challenges. The objective of the study is to assess ARV coverage in a health district with PBF and another without PBF.

**Methods:** This was a quasi-experimental evaluative study. The study population consisted of all health facilities providing HIV/AIDS care. The variables studied were: ARV coverage, HIV testing coverage, ARV recruitment and retention of patients on ARV treatment. Comparisons of indicators were made using exact Fisher's test and odds ratio with 95% CI for  $p < 0.05$ .

**Results:** Compared to Kemo health district which is under PBF, Grimari-Kouango health district had a low development of human resources involved in HIV care, a low evolution of ARV coverage which had dropped from 5% in 2017 to 4% in 2019. Recruitment rates remained above 80% in Kemo, while they were below 50% in Grimari-Kouango with OR=28.69, 95% CI=[19.44;42.34]; retention rates of patients on ARVs in the Kemo health district at 6, 12, 24 and 36 months were 92%, 85%, 82% and 79% respectively. All these results were statistically significant with a  $p < 0.001$ .

**Conclusion:** PBF has enabled the development of human resources, improved ARV coverage, and increased recruitment and retention of patients on ARVs. The CAR should consider scaling up for a better response to the epidemic.

**Key words :** Antiretroviral Coverage, Performance-based Financing, HIV/AIDS.

## Introduction

Performance-Based Financing (PBF) is a results-oriented approach to the health system, defined as the quantity and quality of services produced that are financially accessible. Health facilities are considered to be self-sustaining organizations that make a profit for the benefit of public health objectives and/or their staff. The PBF is not a new health system, as it departs from the traditional system in which authorities are simultaneously responsible for regulation,

delivery, procurement of services, promotion of population voice, and input planning [1-5]. Today, antiretroviral treatment has been shown to reduce HIV-related morbidity and mortality and to slow HIV transmission. People living with HIV must have access to antiretroviral treatment for their survival. Antiretroviral treatment coverage is therefore crucial to address these challenges [6-7]. In addition, UNAIDS has set the 90\*90\*90 target, which consists of diagnosing at least 90% of HIV carriers, treating at least 90% of those who test positive, and making the viral load undetectable in at least 90% of those treated after one year of treatment. To achieve the second target, access to ARVs will have to be improved [8, 9, 10]. Thus, the Central African Republic (CAR) opted, with World Bank support, for the PBF programme to meet this challenge, among other issues. The goal is to strengthen good governance and promote the empowerment of health facilities. The Minimum Activity Package (MAP) to be purchased for the health facilities integrates HIV management indicators, including those related to ARV coverage [10-14]. The objective of this study is to evaluate the contribution of PBF to the improvement of ARV coverage, which is only taking place in the pilot areas, with a view to proposing, if needed, a national scale-up.

## Methods

### Type and setting of study

This was an analytical, retrospective, quasi-experimental study related to the implementation of the PBF approach. It consisted of comparing performance and quality indicators of HIV care in two health districts in CAR, one benefiting from a PBF intervention (Kemo) and the other a control zone without PBF (Grimari-Kouango). These two health districts offer HIV care. The study covered the period from October 5, 2020 to March 12, 2021.

### Sampling

This was a reasoned sampling, based on objective criteria, that both districts are located in more or less stable and geographically accessible areas. They have similar characteristics (socio-demographic and cultural aspects). All health facilities involved in the care of persons living with HIV (PLHIV) and their staff were selected.

### Inclusion and exclusion criteria

Primary target of our study was the health facilities and secondary target was all health staff. Thus, all the health facilities in the two districts identified for the study and having a unit for the management of HIV/AIDS infection with ARVs and all the health staff involved in the care of PLHIV in these health facilities were included. Excluded were facilities with incomplete, unusable, or non-existent data collection materials, as well as health staff involved in the PLHIV intake process at the facility level, but absent or unreachable during data collection.

### Data collection process and tools

Data were collected using a questionnaire, an observation chart, and an interview guide that were pre-tested in two health facilities different from the ones in the study. The data, which covered the years 2017, 2018 and 2019 were collected using the following techniques:

- **a literature review** : statistical data from the two districts, synthetic reports from the health region, validated databases from the central level and care registers, in order to triangulate information. The information collected concerned HIV detection, the number of people living with HIV followed up, those declared lost to follow-up/found, those placed on ARVs, the number of episodes of opportunistic infections ;
- **A semi-in-depth interview** with the medical officers of the health facilities, the heads of the two districts, the managers in charge of the dispensing of drugs and the leaders of the associations of PLHIV who perform the role of psychosocial counselors in the health facilities.

### Variables

The variable of interest is ARV coverage, obtained by the ratio of the number of patients initiated on ARVs to the total number of estimated PLHIV.

Other variables for assessing the level of service delivery performance in relation to ARV coverage were retention of patients on treatment, coverage of HIV testing, level of recruitment of patients on ARVs, occurrence of lost to follow-up, case fatality, occurrence of ARV or reagent breakage, access to biological monitoring, and frequency of occurrence of opportunistic infections.

### Data analysis

Data were entered and stored in the Excel spreadsheet and analyzed

using EPI- info 7.2.6 software. Categorical variables are presented as a proportion (percentage). When the conditions for performing Pearson's chi-2 test were not fulfilled, Fisher's exact test was used to compare the proportions between two different populations. The threshold for statistical significance was  $<0.05$ . Odds ratios with 95% confidence intervals were used to highlight the association between PBF and ARV coverage as well as other indicators of HIV service delivery and care.

### Ethical considerations

Ethical clearance was obtained from the CIESPAC Ethics Committee. A clearance was obtained from the CAR Ministry of Health and Population to access and use the data from the relevant health districts. Confidentiality was not required because the data collected in the document review did not contain any private information that could identify patients or names of survey participants. Participation in the survey was free and informed for the health personnel interviewed.

### Results

#### Staff involved in the management of PLVIH in the two districts

The staff involved in the care of PLHIV at the district levels are physicians, Nurses and State Certified Midwives (IDE/SFDE) and Psychosocial Counselors (CPS). In 2017, Grimari-Kouango district had one physician, 3 IDE/SFDEs and 02 CPSs. These numbers will remain static until 2019. However, for the Kemo district under PBF, the number of physicians, IDE/SFDE and Psychosocial Counselors increased from 1 to 4, 3 to 8 and 2 to 12 respectively between 2017 and 2020.

#### Evolution of ARV coverage in Kémo and Grimari-Kouango health districts from 2017 to 2019

The health district of Grimari-Kouango experienced a regular decline in ARV coverage from 2017 to 2019. In contrast, for the Kemo health district, it was significantly increasing, and thus PBF was associated with increasing ARV coverage (Table 1). Compared to the Grimari - Kouango district which had less than 20% ARV coverage among pregnant women in the three years, the Kemo health district had coverage that varied from 30 to 42%. There was an association between PBF and ARV coverage with an Odds Ratio= 5.74 and 95% CI = [3.52-9.37] in 2019. Similarly, ARV coverage among pregnant women was 4 times higher in Kemo than in Grimari-Kouango in 2019.

District	Population	PVVIH	Prevalence (%)	ARV		Coverage (%)	OR	95% CI	p
				Yes	No				
<b>Year</b>					<b>2017</b>				
Kemo	118410	3 434	02.90	364	3070	11.86	2.34	2.01-2.78	<0.001
GK	146369	5 855	04.00	279	5576	04.76	-		
<b>Year</b>					<b>2018</b>				
Kemo	124211	3 602	02.90	567	3035	15.74	4.05	3.51-4.68	<0.001
GK	177765	7 111	04.00	313	6798	04.40	-		
<b>Year</b>					<b>2019</b>				
Kemo	148874	4 317	02.90	758	3559	17.56	5.31	4.63-6.09	<0.001
GK	205675	8 227	04.00	317	7910	03.85	-		

Table1: Evolution of ARV coverage from 2017 to 2019 in health districts of Kemo and Grimari-Kouango

#### Performance level of service delivery indicators related to ARV coverage in Kemo and Grimari-Kouango health districts from 2017 to 2019

The main indicators measured were patient recruitment rates (and pregnant women), screening coverage, screening and treatment rates for tuberculosis patients and children with malnutrition.

At the Kemo health district level under PBF, more than 80% of registered PLHIV had been effectively put on ARVs during the period 2017 to 2019, in contrast to the Grimari Kouango district which had low recruitment rates of less than 50 per 100 person-years for the same period. This result was statistically significant with a strong association between PBF and ARV recruitment,  $p<0.001$  OR=55.66;

95% CI= [30.05-103.07] in 2018. Among pregnant women, the Kémo health district under PBF stands out with a recruitment rate of more than 95%, in contrast to Grimari-Kouango, which had a rate of

about 80 per 100 women-years. This result is statistically significant with  $p < 0.001$  (Figure 1).

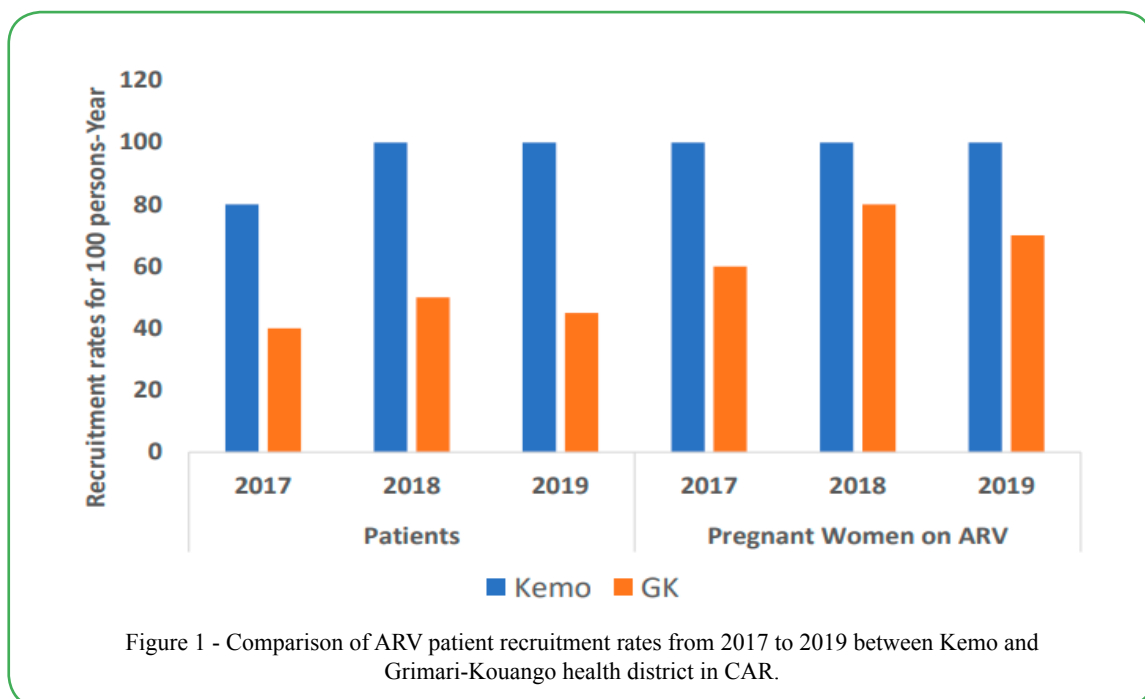


Figure 1 - Comparison of ARV patient recruitment rates from 2017 to 2019 between Kemo and Grimari-Kouango health district in CAR.

Of the 514 TB patients registered over three years in Kemo district, under PBF, 505 or 98% were tested for HIV and 100% of TB/HIV co-infected patients who tested positive were put on ARVs. While in the control district of Grimari-Kouango, out of 263 registered TB patients, only 148 or 56% were tested for HIV and only 63% of the TB/HIV infected patients who tested positive were put on ARV treatment. The difference is statistically significant with  $p < 0.001$  for testing. Compared to Grimari-Kouango health district, all cases of HIV-positive cases of children with malnutrition in Kemo health district have been placed on antiretroviral treatment. While nearly 30% of malnourished children in Grimari-Kouango health district who tested positive for HIV were not placed on antiretroviral treatment. This difference is statistically significant with a  $p < 0.001$ . Regarding access to viral testing, about 50% of patients on ARV in

Kemo health district had access to viral testing; however, less than 5% of patients in Grimari-Kouango health district had access to viral testing.

**Comparison of retention rate of patients on ARVs between Kemo and Grimari-Kouango health districts from 2017-2020 and other indicators**

The retention rates of patients on ARVs in Kemo health district under PBF at 6,12,24 and 36 months are respectively 92, 85, 82 and 79 person-months compared to Grimari Kouango district, it was down to 81 at 6 months, 63 at 12 months, 41 at 24 months and 30 person-months at 36 months. The PBF was associated with retention of patients on ARVs. The difference was statistically significant with a  $p < 0.001$  (Table 2).

District	Initial ARV	ARV r	ABD	TRt (% -months)	$\chi^2$	p	OR	95% CI
<b>Period</b>				<b>6 months</b>				
KEMO	364	335	29	15.34	17.27	< 0.001	2.7	1.67-4.39
GK	279	226	53	13.50				
<b>Period</b>				<b>12 months</b>				
KEMO	364	309	55	07.07	41.69	< 0.001	3.33	2.29-4.86
GK	279	175	104	05.23				
<b>Period</b>				<b>24 months</b>				
KEMO	364	299	65	03.24	115.36	< 0.001	6.56	4.58-9.39
GK	279	115	164	01.72				
<b>Period</b>				<b>36 months</b>				
KEMO	364	288	76	02.20	155.60	< 0.001	8.79	6.13-12.60
GK	279	84	195	00.84				

Initial ARV: Number of patients under ARV from 2017 ; GK = Grimari-Kouango ; ARV r : Number of patients who remained on ARV ; ABD= number of patients who discontinued traetment; TRt = retention rate under treatment.

Table 2: Comparison of retention rate of patients on ARV at 6, 12, 24 and 36 months between Kemo and Grimari-Kouango health districts from 2017-2020.

From 2017 to 2019, each year, 4% of PLHIV followed up, develop severe opportunistic infections in the Grimari-Kouango control health district versus 1% in the Kemo district under PBF. For example, in 2019, patients followed in the Kemo district are 80 times less likely to develop an opportunistic infection than those in the Grimari-

Kouango district OR = 0.16, 95% CI: 0.06 - 0.42,  $p < 0.001$  (Table 3). HIV case fatality was twice as high in 2017 and 2019 in Grimari-Kouango health district than Kemo district. This lethality was three times higher in 2018. PBF reduces the occurrence of death with odds ratios less than 1 and  $p$  is significant.

District	PLHIV	OI +	OI-	TSOI(%-year)	$\chi^2$	p	OR	95% CI
<b>Year</b>					<b>2017</b>			
Kemo	434	06	428	1.38	8.19	0.0014	0.29	0.12-0.72
GK	734	33	701	4.50	-			
<b>Year</b>					<b>2018</b>			
Kemo	578	5	573	0.87	10.57	0.0004	0.22	0.08-0.60
GK	651	24	627	3.69	-			
<b>Year</b>					<b>2019</b>			
Kemo	789	5	784	0.63	17.66	<0.001	0.16	0.06-0.42
GK	689	26	663	3.77	-			

\*PVVH= PLHIV registered at the site ; \*OI + = Number of PLHIV with severe opportunistic infections ; \*OI - = Number of PLHIV without opportunistic infection ; \*TSOI = rate of occurrence of opportunistic infection ; \*GK= Grimari-Kouango.

Table 3: Comparison of frequency of occurrence of severe opportunistic infections

## Discussion

### Evolution of human resources involved in HIV/AIDS care in the health districts of Kemo and Grimari-Kouango

The number of staff involved in HIV care in the district undergoing PBF is steadily increasing each year, unlike the other district without PBF. Several studies have addressed this aspect and some results are consistent with ours, but others are higher [4, 11]. In all cases, these results can be explained by considering that with PBF subsidies, staff are motivated to remain stable within the health facilities despite the sometimes worrying security context. These subsidies facilitate local recruitments independently of the general movements and assignments of government employees by the Ministry of Health authorities. Also, the business plans of the health facilities under PBF have allowed for autonomous management, unlike the Grimari Kouango district, which relies solely on state support and mini revenues from cost recovery. Some countries such as Rwanda have a long experience with PBF which was applied as a state system throughout the country and has a small area. The staff being trained and deployed in sufficient numbers in the field with a particularly reinforced community system and a computerization of the support system which relieves the health facilities, only serious cases are presented to the hospital which were also rare, given the efficiency of the management [15].

### Description of the evolution of ARV coverage

ARV coverage was progressively higher than in the Grimari-Kouango health district. This difference can be explained by the existence in the Kemo health facilities of an initiative for systematic HIV screening of index cases and potential entry points (malnutrition, Prevention of mother-to-child transmission of HIV, TB patients, etc.), a high rate of recruitment on ARVs, and advanced screening strategies in health posts and surrounding villages, which contributed to the increase in this coverage. Although low, ARV coverage in Kemo is higher than in Grimari -Kouango and is close to the national coverage which was 19% in 2017. It is also important to note that 15 indicators related to improved coverage were purchased at lower cost by PASS out of the 31 health indicators covered by the pilot project, which generated financial resources for the health facilities and is a source of motivation. But some studies have shown much

higher ARV coverage, ranging from 44 to 91 %. Rwanda has a strong health system and has adopted the performancebased approach as a state system for over two decades. Similarly, the authors concluded that PBF had a clear impact on improving health program indicators, including those for HIV, but with strong community involvement [15-18].

In general, the results obtained in the two districts are still low. They are justified by the low screening coverage, low geographical coverage and the non-functionality of certain posts destroyed during the armed conflicts that the country has experienced, and above all by the shortage of reagents and ARVs observed during the study period due to a weakness in the supply system. These results are far from reaching the UNAIDS 90-90-90 targets.

In the district under PBF, ARV coverage among pregnant women had increased from 30% to 42% between 2017 and 2019. This coverage was four times higher than in the Grimari-Kouango district in 2019. This difference can be explained by the fact that 60% of the indicators purchased by the project are related to prenatal consultation activities and HIV management in pregnant women. These results are lower than those observed by other studies in Uganda and West and Central Africa, which is 58% for the same period [19, 20]. This difference would be due to Uganda's mother-to-child HIV transmission program being among the best in sub-Saharan Africa with strong political leadership and commitment with the remarkable personal involvement of the country's First Lady, as well as most West African countries being security stable and having a better performing health system than Central African countries; and government funding being more visible than in Central Africa [19, 20].

### Performance level of HIV/AIDS service delivery indicators in relation to ARV coverage in Kemo and Grimari-Kouango health districts

#### Offer of antiretroviral treatment

The health district under PBF stands out with a better overall recruitment rate which is more than 80% among adult and child PLHIV, more specifically this rate was 95% among pregnant women, 100% among TB patients and among children who developed severe or moderate malnutrition. Despite the difficult security context, more

than 80% of registered PLHIV had been effectively put on ARVs during the period from 2017 to 2019, in contrast to Grimari Kouango district which had low recruitment rates. Our results are lower than those obtained by other studies [15, 21, 22]. The difference can be explained by considering that in some countries such as Rwanda or Mozambique there is not only a performance-based State System, a long experience in the management of HIV infection and a strong policy of task delegation, but above all an efficient drug supply system. Finally, for more than two decades, the Rwandan government has been one of the few African countries that, apart from the additional grant from the Global Fund to fight AIDS, purchases ARVs with its own funds. In all cases, a good health system contributes to the improvement of these indicators [5, 11, 23, 24]. In our context, most of the HIV-related indicators purchased by the PASS project motivate providers to put more people on ARVs. In addition to these motivating indicators, the health facilities in Kemo District are effectively implementing the WHO "Test and Treat" strategy, which is integrated into the national guidelines. Also, the Kemo District Health Management Team regularly organizes supervision and coaching to ensure compliance with the guidelines and to strengthen the capacity of field staff. The availability of human resources, including community members, has reduced individual workloads and facilitated real-time recruitment.

#### **Offer of HIV screening**

HIV screening coverage among pregnant women in Kemo health district increased from 32% to 42%, a screening rate of 95% among tuberculosis patients and 80% among children with severe or moderate malnutrition. These results are very different from those obtained elsewhere [10, 11, 19]. The difference can be explained by having some national programs for mother-to-child transmission of HIV that are more successful through strong community mobilization with national leadership and political commitment [19]. In all cases, among the indicators related to HIV control, purchased by the PASS project, some are directly related to HIV screening of pregnant women, tuberculosis patients and malnourished children, such as the number of cases referred by community outreach and arrived at the health center: pregnant women referred for delivery, mothers referred for pre- and post-natal consultations; new family planning acceptors referred or children aged 0-59 months during the community Integrated management of childhood diseases. This motivates provider-initiated screening.

#### **Biological follow-up**

From 2017 to 2019, approximately 50% of patients on ARVs in the Kemo health district had to undergo viral charge testing, unlike the other district without PBF. Since this test cannot be done on site, the PBF subsidies allowed the heads of the health facilities to take samples and transport them to Bangui for analysis within the recommended timeframe. However, this performance did not come close to the standard set by UNAIDS that all patients should have their viral charge tested, but that 90% of patients should have an undetectable viral charge. Our results are inferior to those obtained in some countries [25-27]. Guinea, for example, benefited from the support of the NGO Médecins sans Frontières, which provided the district hospital with a Gene-expert device, a therapeutic committee composed of different socio-professional categories with substantial expertise in the management of the infection, and a level 2 analysis laboratory provided by WHO.

### **Benefits of PBF on the management of HIV/AIDS infection**

#### **Retention of patients on ARVs**

The retention rates of patients on ARVs in Kemo health district under PBF at 6, 12, 24 and 36 months are respectively 92%, 85%, 82% and 79% and are higher than those of the health district without PBF. Compared to WHO and UNAIDS standards, this result appears to be good. In fact, according to WHO and other studies, for a country with limited resources, as is the case in CAR, retention of patients

on ARVs decreases at 6, 12, 24 and 36 months and is respectively 90%, 85%, 75% and 65% [28 - 30]. The satisfactory results obtained by Kemo could be explained because, in addition to the purchased indicators, the district has 12 community outreach workers, mainly from PLHIV associations and the prevention of mother-to-child transmission of HIV support group, who support it in accompanying patients. These psycho-social counselors are expert patients who play an important role in the therapeutic education of peers in the health facilities, particularly through advice on adherence and compliance with antiretroviral treatment. These psycho-social counselors, recruited and paid by the project's subsidies, are also deployed for: the active search for lost persons, home visits to bedridden patients, sensitizations in the neighborhoods and within their entities.

### **Lethality, input disruption, and active tracking of lost to follow-up**

HIV case fatality was half as high in 2017 and 2019 in Kemo health district as in Grimari-Kouango, with a low rate of lost to follow-up and no HIV reagent breakage. These results are similar to those obtained by other authors [10, 17]. These results could be explained by the fact that in the Kemo health district, patient follow-up was regular and the health facilities had more qualified and trained personnel involved in the management of PLHIV. Patients who developed severe opportunistic infections were systematically visited by psycho-social counselors who are community members recruited by the health facilities. Therapeutic education carried out among patients should facilitate adherence and compliance to antiretroviral treatment, guarantee a better response to treatment and reduce morbidity and mortality. This adherence to treatment would also have been at the origin of the low occurrence of lost to follow-up cases, which justifies the rarity of this phenomenon in Kemo, especially when one knows that this indicator is purchased by the project.

### **Conclusion**

The PBF contributed to the increase in the number of staff involved in the management of HIV/AIDS in the Kemo health district, both in terms of quantity and quality, as well as ARV coverage. PBF support has significantly improved the level of performance indicators and HIV/AIDS service delivery in the Kemo health district under PBF compared to the control health district of Grimari Kouango. Although satisfactory, this performance remains low, far from the UNAIDS initiatives that recommend at least 90% ARV coverage if the epidemic is to be ended by 2030. It is also far from the objectives set by the catch-up plan for West and Central African countries. The approach should be recommended, popularized and reinforced.

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**Competing interests:** The authors declare that they have no competing interests.

### **Authors' contributions**

SHW, RBMB conceived and designed the research. Contribution to data collection and ethical committee and statistical analysis: SHW, JSSA, DN, HN, PMT. All authors read and approved the final version of the manuscript.

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### **Data availability**

The datasets used and analysed during the current study available from the corresponding author on reasonable request. The datasets generated and/or analysed during the current study are not publicly available due to the promise made to health staff to keep the data confidential when they are questioned, but are available from the corresponding author on reasonable request.

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