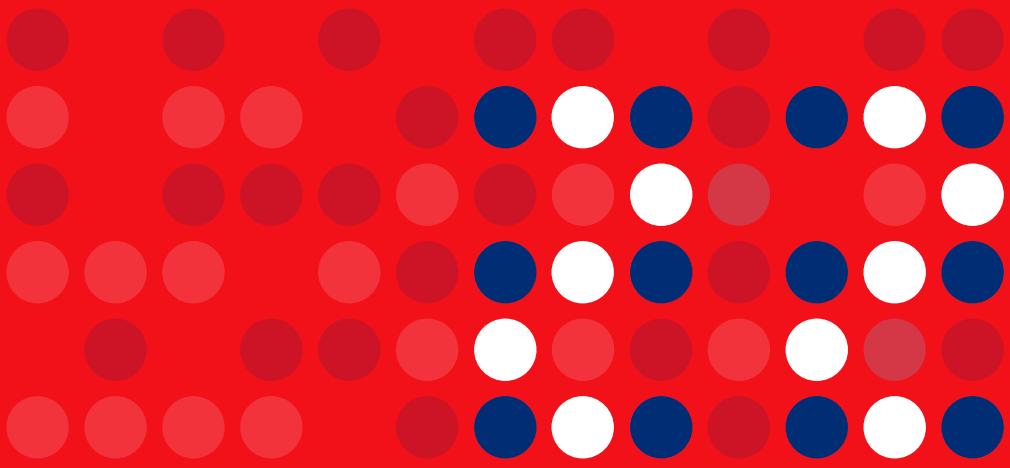
Human Immunodeficiency Virus (HIV)
Infection in the Netherlands

HIV Monitoring

HIV Monitoring Report 2022

Chapter 7: Quality of care



7. Quality of care

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Introduction

One of the missions of stichting hiv monitoring (SHM) is to contribute to the quality of HIV care in the Netherlands. Via the collection of pseudonymised data from patients in outpatient care at the 24 dedicated treatment centres, SHM can provide a nationwide overview of the outcome of care for patients. This unique overview allows SHM to facilitate assessment of the quality of HIV care in the Netherlands.

HIV treatment guidelines are not only intended to help healthcare providers provide optimal care, but also to reduce the variation in care between different treatment centres. The Dutch Association of HIV-Treating Physicians (*Nederlandse Vereniging van HIV Behandelaren*, NVHB) has issued national guidelines for the treatment and monitoring of people living with HIV in the Netherlands[1]. In general, these guidelines follow the United States Department of Health and Human Services (DHHS) HIV/AIDS practice guidelines[1]. Using these guidelines as a basis, we defined a set of indicators that have been used in this analysis to explore the quality of care in Dutch HIV treatment centres, and provide insight into any potential variation between centres.

Our analysis is based on the data of individuals who were diagnosed with HIV, entered care and were registered with the SHM (*Box 7.1*). The indicators selected for this analysis fall into three categories: volume; outcome; or process. Each category contains a host of specific indicators, which are applicable to different focus populations. The details of the indicators used in this chapter, along with the focus populations to which they were applied, are defined in *Box 7.2*. Indicators are reported for the 24 HIV treatment centres individually. Each HIV treatment centre is referenced by a number, which is used consistently across all figures in this chapter.

Box 7.1: Definitions used in this chapter.

Diagnosis	The moment an HIV infection is identified in an individual. The time of diagnosis can be weeks, months, or years after infection.
Entry into care	The moment an individual living with HIV first receives care at an HIV treatment centre. This usually takes place within a few weeks of HIV diagnosis.
Registration	The moment an HIV physician or nurse notifies SHM of an individual living with HIV (in care) and the individual's details are recorded in the SHM database. Registration usually takes place within a few months of entering care, but can take longer. Demographic and clinical data from the time of HIV diagnosis can only be collected after registration.
Patient	An individual living with HIV who is receiving, or has received, medical care at an HIV treatment centre. This term is specifically used in this chapter to denote the role of the individual in a medical context.

Box 7.2: Definitions of specific indicators and focus populations.

Specific indicator	Definition	Focus population
Volume indicator		
Newly entering care	The number of patients who entered care at one of the Dutch HIV treatment centres for the first time.	Entered care
Outcome indicators		
Retention in care		
Short-term retention	The percentage of patients who were still in care at least 18 months after entering care.	Entered care[1]
Overall retention	The percentage of all patients who had a documented clinical visit.	In care
Initiation of ART		
Early ART initiation	The percentage of patients who initiated ART within six months of entry into care.	Entered care[2]
Overall ART initiation	The percentage of patients who have initiated ART.	In care

Specific indicator	Definition	Focus population
Viral suppression		
Suppression after ART initiation	The percentage of patients with a plasma HIV RNA level <400 copies/ml within nine months of ART initiation.	Starting ART[3]
Suppression while on ART	The percentage of patients with a plasma HIV RNA level <100 copies/ml.	On ART[4]
Suppression while in care	The percentage of patients with a plasma HIV RNA level <100 copies/ml.	In care
Process indicators		
Lab measurements prior to ART	The percentage of patients for whom data were available on plasma HIV RNA or CD4 count within the six months prior to, or the one month following ART initiation.	Starting ART[3]
Lab measurements while in care	The percentage of patients for whom data were available on plasma HIV RNA or CD4 count.	In care

All indicators are reported within a given year.

Abbreviations: ART = (combination) antiretroviral therapy.

[1] This indicator is calculated for patients who entered care in the two years prior to a given year. It does not include individuals who moved abroad or died.

[2] Entered care and did not move abroad or die.

[3] Treatment-naive people who started ART in a given calendar year.

[4] On ART for at least six months and still in care in a given calendar year.

Volume indicator

As a volume indicator we quantified the number of patients *newly entering care* each year per treatment centre.

Outcome indicators

The outcome indicators include *retention in care*, *initiation of ART* and achievement of *viral suppression*.

For the purpose of the current analysis, we have defined short-term and overall retention in care as follows:

1. *Short-term retention in care*: The percentage of patients who entered care for the first time at one of the Dutch HIV treatment centres, after being diagnosed with HIV, who were still alive and in care at least 18 months after entering care. Patients known to have died or moved abroad were excluded from this retention-in-care indicator. Approximately 11% and 11% of patients who entered care in 2017 and 2018, respectively, switched treatment centres (mainly due to the closure of two treatment centres in 2018); we considered these to be retained in care, since they were not lost to follow up. However, to avoid double counting, they were assigned to their most recent treatment centre.
2. *Overall retention in care*: The percentage of all patients in care who did not move abroad or die, *and* had a documented clinical visit for a given year. Again, patients switching treatment centres were considered to be retained in care and were assigned to their most recent treatment centre.

Initiation of ART describes: (i) the patients entering care who started ART within six months of entry; and (ii) the percentage of patients still in care who have ever initiated ART.

Viral suppression was assessed by three indicators:

1. The percentage of treatment-naive patients, who started ART, with a plasma HIV RNA level below 400 copies/ml within nine months of starting ART;
2. The percentage of all patients on ART for at least six months who had a plasma HIV RNA level below 100 copies/ml; and
3. The percentage of all patients in care who had a last available HIV RNA level below 100 copies/ml.

Process indicators

Process indicators were calculated for two scenarios: (i) prior to starting ART and (ii) while in care.

To calculate indicators *prior to ART initiation,* we included all patients who had newly entered care in a given year. Patients who switched treatment centres were not counted as newly entering care, as they had already been in care elsewhere. Two separate indicators were defined as the percentage of individuals initiating ART for whom (i) plasma HIV RNA or (ii) CD4 count measurements were available in the six months prior to, or the one month following ART initiation. This period was selected as some patients may have initiated ART directly after entering care, in which case HIV RNA or CD4 count measurements will have been measured on the same day or directly after ART initiation.

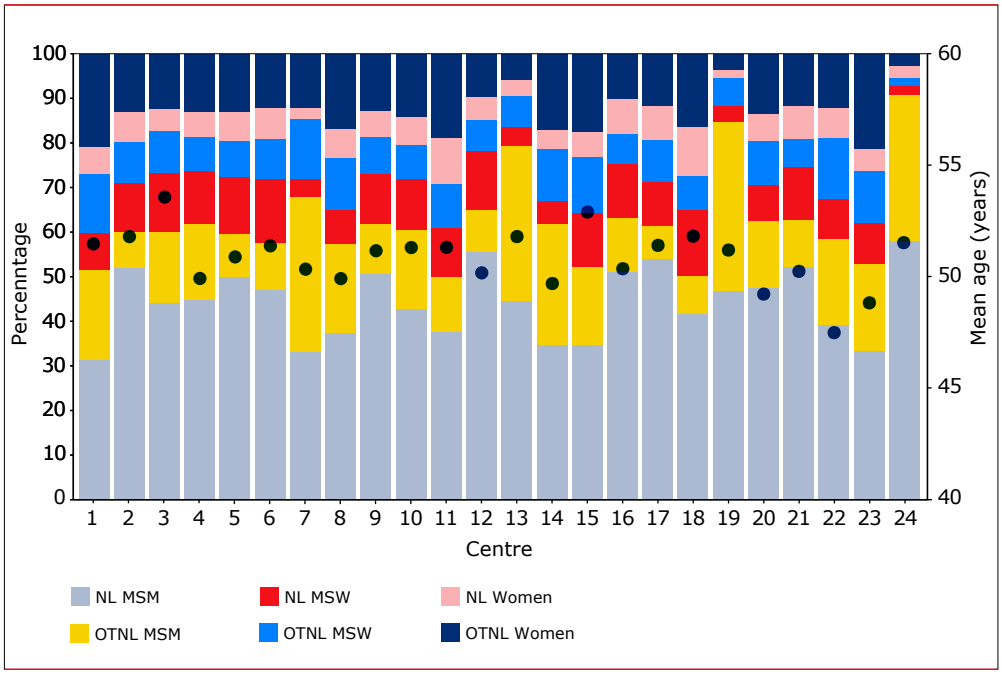
To calculate indicators *while in care*, we included all individuals who were in care and did not move abroad or die. Two separate indicators were defined as the percentage of patients in care for whom (i) plasma HIV RNA or (ii) CD4 count measurements were recorded at least once during a given calendar year.

Centre overview

The characteristics of patients in care in 2021 are described per HIV treatment centre in *Figure 7.1* (i.e., patient 'mix'). Overall, the mean within-centre age range was 47 to 54 years (median 51 years). The largest geographical origin/mode of transmission/gender group observed for almost all centres was Dutch men who have sex with men (MSM), ranging from 32% to 58% (median 45%) of patients per centre. Most individuals in the 'other than Dutch' groups originated from the Caribbean/South America (30%), sub-Saharan Africa (28%), other countries in Europe (12%), or southeast Asia (9%). The distribution of regions of birth for patients other than Dutch in care in 2021 are described per centre in *Appendix Figure 7.A*. There was substantial variation across centres in the other geographical origin/mode of transmission/gender groups:

- Other than Dutch MSM (median 17%, range 7-38%)
- Dutch men who exclusively have sex with women (MSW) (median 11%, range 2–15%)
- Other than Dutch MSW (median 9%, range 2–14%)
- Dutch women (median 6%, range 2–11%)
- Other than Dutch women (median 13%, range 2–21%).

Figure 7.1: Description of the patient 'mix' for patients in care in 2021 in the Netherlands.



***Note:** The bars in this chart show the percentage of individuals per centre according to geographical origin/ mode of transmission/gender group. Black dots represent the mean age of patients in care at each centre.*
***Legend:** MSM = men who have sex with men; MSW = men who exclusively have sex with women; NL = Dutch; OTNL = other than Dutch.*

Evolution of indicators over time

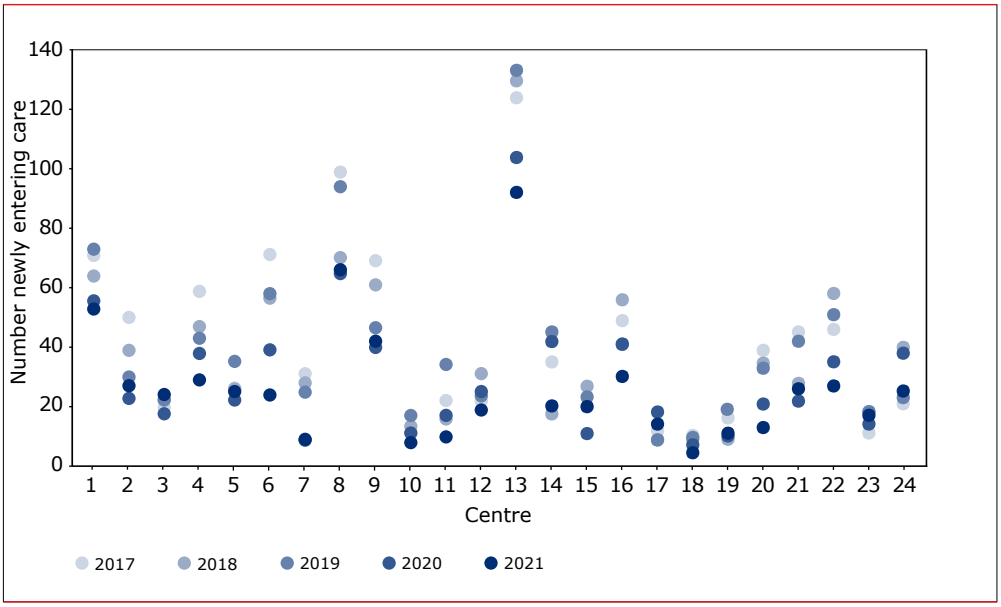
HIV testing and treatment guidelines have remained unchanged in the Netherlands since 2015. The distribution of patient 'mix' in care has also remained relatively stable over the past five years. As a result, increases in the percent of the indicators over time are likely to indicate organisational improvement in providing care to patients living with HIV, while decreases might indicate potential issues that require further assessment. To provide an understanding of how indicators have evolved, each indicator in *Box 7.2* has been reported for its corresponding focus population on an annual basis between 2017 and 2021. For example, the indicator 'overall ART initiation' has been provided for individuals who were in care in 2017, 2018, 2019, 2020, and 2021.

The first case of severe acute respiratory syndrome coronavirus 2, which causes the disease known as COVID-19, was detected in the Netherlands on 27 February 2020[2]. The rapidly evolving SARS-CoV-2 pandemic forced HIV treatment centres to reorganise their services at the end of March 2020. Visits that usually took place physically at the HIV treatment centres were, for the most part, replaced with other types of consultations, such as virtual consultations via a web camera or telephone, and blood had to be drawn at other locations. These reduced services continued during more severe epidemic waves of SARS-CoV-2 in 2020 and 2021, and may have affected many of the indicators for quality of care. Particular attention has thus been given to the changes in indicators between 2019 and 2021.

Volume indicator

The numbers of patients who newly entered care across the HIV treatment centres each year are shown in *Figure 7.2*; this number has steadily decreased for most centres over the past five years. The median number who newly entered care across centres was 23 in 2020 and 24 in 2021, with a minimum number of seven patients in 2020 and three in 2021. In 2021, nine HIV treatment centres had fewer than 20 patients newly entering care; all of these were of small patient size (i.e., fewer than 400 in care).

Figure 7.2: *Annual number of patients newly entering care per HIV treatment centre in the Netherlands between 2017 and 2021.*



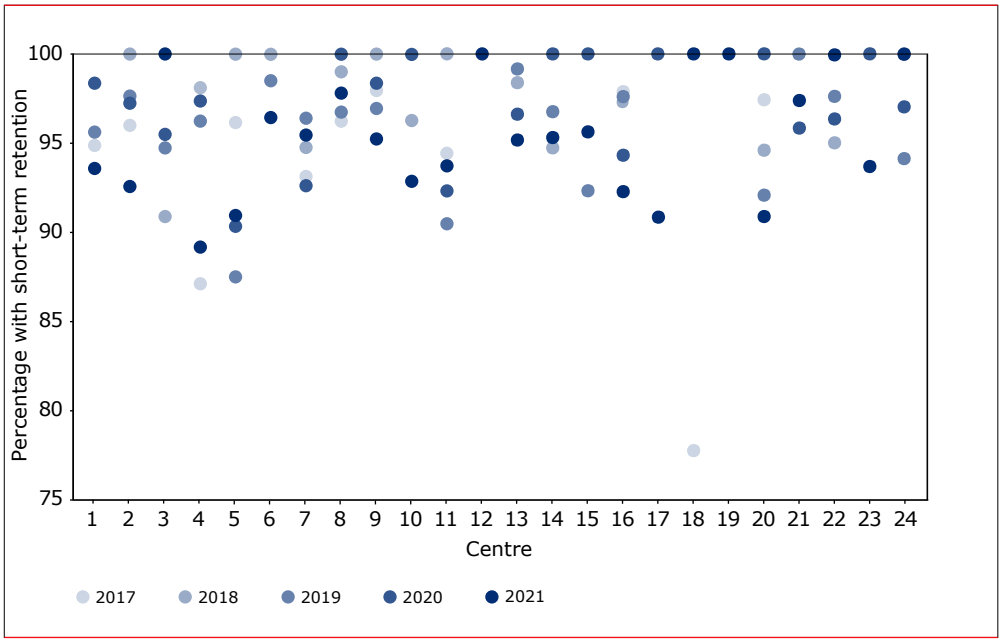
Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

Outcome indicators

Retention in care

The annual percentage of patients with short-term retention has remained stable over the past five years and can be viewed per centre in *Figure 7.3*. The median percentage across centres was 98% (range 90–100%) in 2020, for patients entering care in 2018, and 95% (range 89–100%) in 2021, for those entering care in 2019. For most centres, the difference between 2021 and 2019 was within a margin of ±2%. A decrease of more than 5% was observed in five centres, all of which were of small patient size and thus more susceptible to having larger differences in percentages.

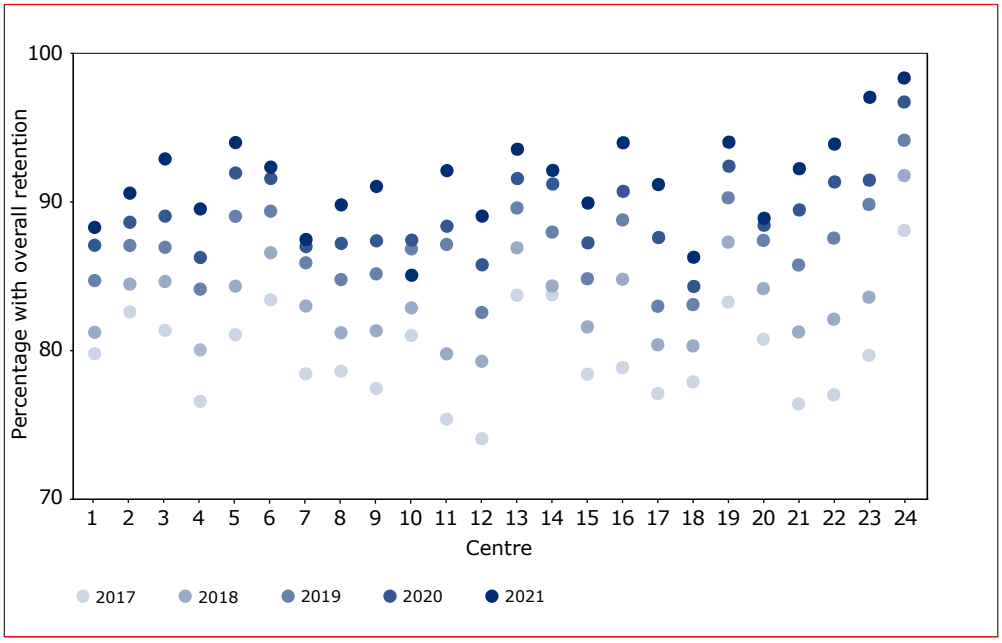
Figure 7.3: *Short-term retention in care; in other words, patients who entered care two years prior to 2017, 2018, 2019, 2020, or 2021, and were still in care 18 months later.*



Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

The annual percentage of patients per centre with overall retention is given in *Figure 7.4*. This percentage has steadily increased for most centres over the past five years. The median increase from 2017 to 2021 across centres was 11% (range 4–17). It is worth noting that the median percentage with overall retention across centres was 89% (range 84–97%) in 2020 and 92% (range 85–98%) in 2021. No centre experienced a decrease of more than 2% between 2019 and 2021.

Figure 7.4: *Overall retention in care; in other words, patients in care who had a documented visit per calendar year between 2017 and 2021.*



Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

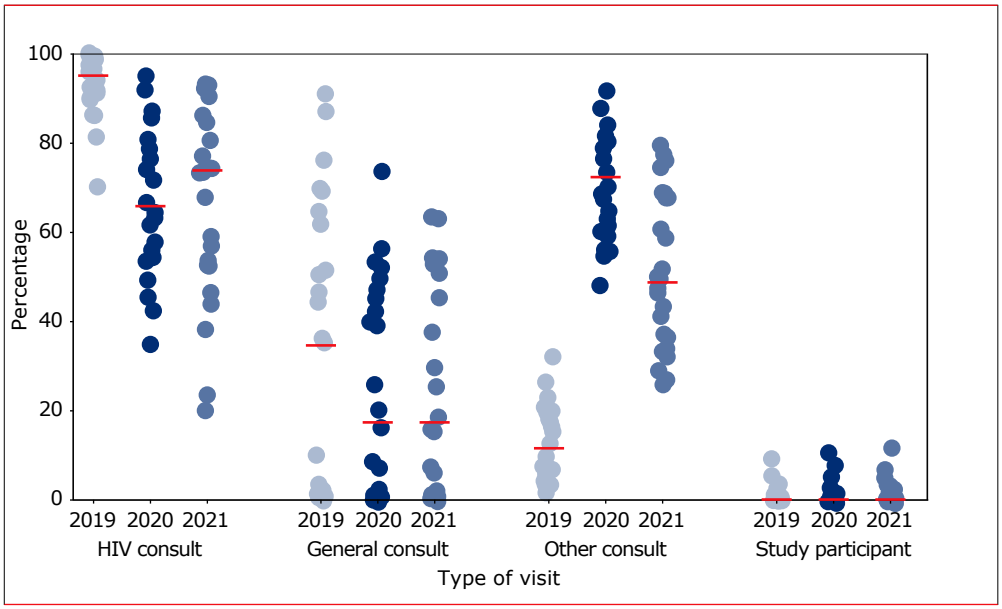
Overall retention is defined by whether a visit occurred during a given year. Since services at many of the HIV treatment centres were greatly reduced during the COVID-19 pandemic, alternative consultation options were required. *Figure 7.5* illustrates the change in visit types between 2019 and 2021 for those in care.

The median percentage of patients who had a physical consultation with an HIV specialist during the year decreased from 99% (range 97–100%) in 2019 to 80% (range 54–96%) in 2020 and remained comparable at 82% (range 48–95%) in 2021.

Similarly, the median percentage of patients who had a physical consultation with another specialist, consultant, or nurse consultant/specialist decreased from 35% (range 0–91%) in 2019 to 18% (range 0–74%) in 2020 and remained comparable at 17% (range 1–65%) in 2021.

In contrast, the percentage of patients who had a non-physical consultation with any type of healthcare professional increased from a median 12% (range 2–32%) in 2019 to 72% (range 47–91%) in 2020 and slightly decreased to 49% (range 25–81%) in 2021. Most of these consultations in 2021 occurred over the telephone or via email (97%) and few occurred virtually using video consultation (3%) or other means (3%). The proportion of patients who had a consultation as part of participating in a study remained comparable between 2019 and 2021. It should be noted that patients could have had more than one type of visit during the year and hence these percentages are not mutually exclusive.

Figure 7.5: *Distribution of visit types for patients in care between 2019 and 2021.*



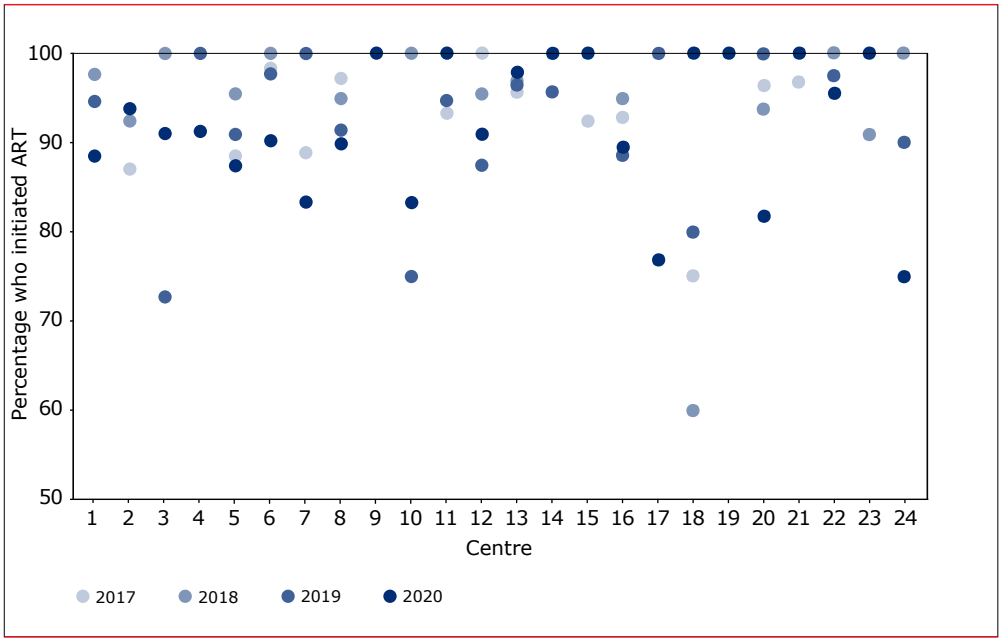
Legend: *"HIV consult" refers to a physical consultation with an HIV specialist. "General consult" refers to a physical consultation with another specialist, consultant, or nurse. "Other consult" refers to a consultation with any type of healthcare professional, which replaced what would have been a physical consultation. "Study participant" refers to a visit as part of participating in a biomedical study.*

Initiation of ART

The annual percentage of patients per centre who started ART within six months of entering care is given in *Figure 7.6*. This percentage varied only slightly at most centres over calendar years. Across centres, the median percentage was 96% (range 73–100%) in 2019 and 91% (range 75–100%) in 2020. Eight centres had a percentage lower than 90%, of which seven were small patient size and one was large patient size (i.e., more than 700 in care).

For individuals who started ART, the time between entering care in 2020 to starting their treatment, averaged within centres, was a median 13 days (range 3–35). No data are given for 2021 as there has not been enough follow-up time to calculate this indicator for patients who entered care in the latter half of 2021.

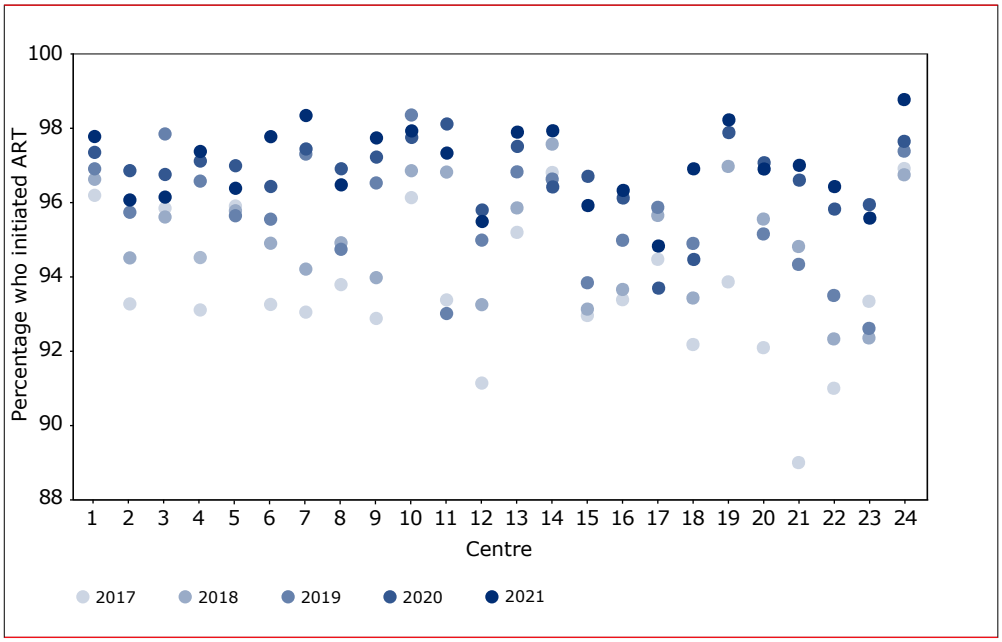
Figure 7.6: *The annual percentage of patients entering care between 2017 and 2020 who started combination antiretroviral therapy (ART) within six months of entry.*



Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

The annual percentage of patients per centre remaining in care who ever initiated ART is given in *Figure 7.7*. This percentage has been steadily increasing for most centres over the past five years. The vast majority of patients in care in 2020 and 2021 initiated ART (across-centre median 97% and 97%, respectively). This figure reached or exceeded 95% in all centres in 2021.

Figure 7.7: *The annual percentage of patients in care between 2017 and 2021 who ever initiated combination antiretroviral therapy (ART).*



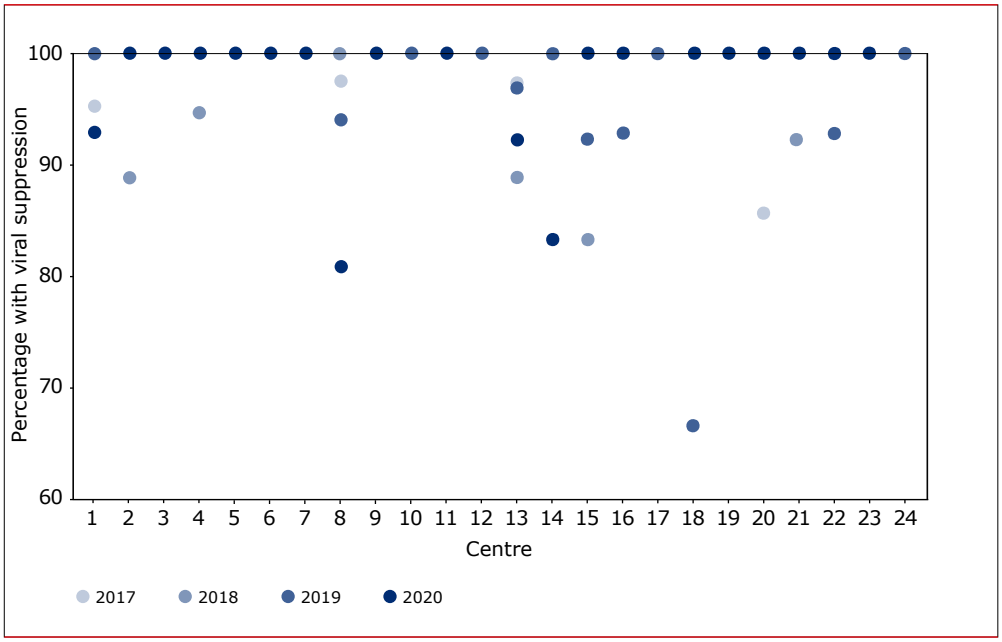
Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

Viral suppression

Viral suppression was assessed using three indicators. The *first* of these is the percentage of treatment-naive patients newly initiating treatment who had an HIV RNA level below 100 copies/ml within nine months of starting ART. The annual percentage per centre is given in *Figure 7.8*, which shows consistently high proportions at most centres for individuals initiating ART between 2017 and 2020. The median percentage with viral suppression after ART initiation was 100% (range 93–100%) in 2019 and 100% (range 81–100%) in 2020; three centres with fewer than three patients were excluded from the calculation in both

2019 and 2020. No data are given for 2021 as there has not been enough follow-up time to calculate this indicator for patients who initiated ART in the latter half of 2021.

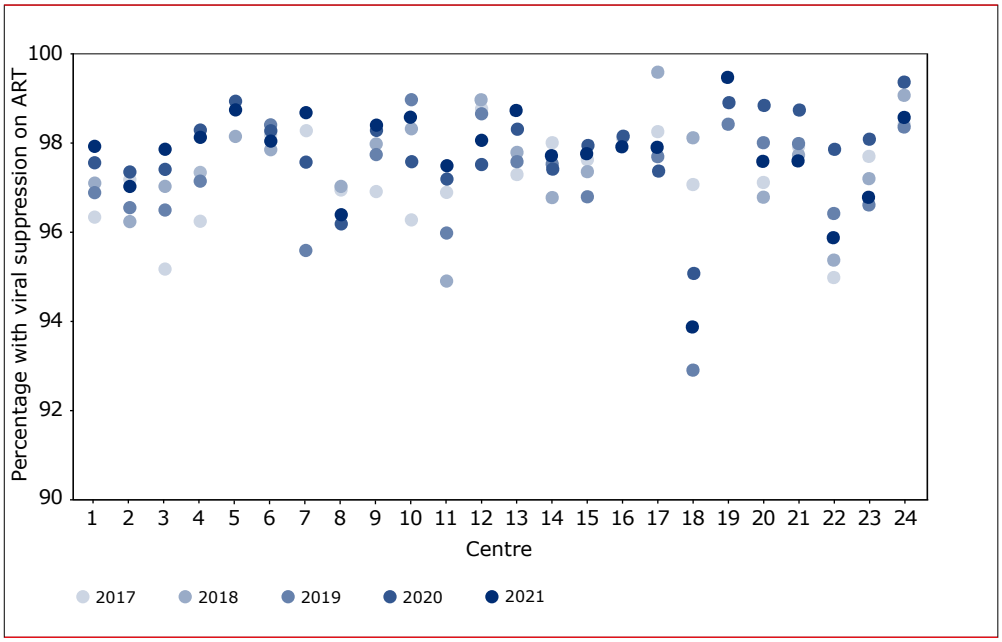
Figure 7.8: *The annual percentage of all patients who initiated combination antiretroviral therapy (ART) and stayed on it at least six months between 2017 and 2020, and who had an HIV RNA level <100 copies/ml within nine months of initiating treatment.*



Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1. Three centres were excluded – three in 2019 (centres 11, 18, and 19) and three in 2020 (centre 12, 17, and 24) – as they had fewer than three patients included in the indicator.*

The *second* viral suppression indicator is the percentage of all patients in care who have been on ART for at least six months and have a last available HIV RNA level below 100 copies/ml. This annual percentage is given per centre in *Figure 7.9*, which shows rather high percentages with little variation over the past five years. The median percentage was 98% (range 95–99%) in 2020 and 98% (range 94–99%) in 2021.

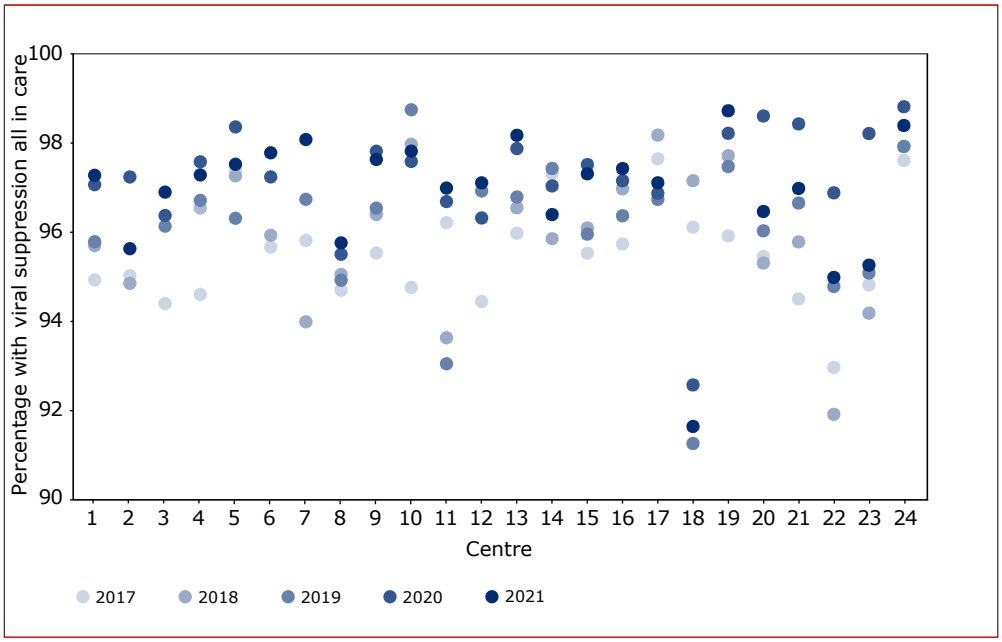
Figure 7.9: *The annual percentage of all patients on combination antiretroviral therapy (ART) for at least six months between 2017 and 2021 who had an HIV RNA level <100 copies/ml.*



Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

The *third* viral suppression indicator is the percentage of all patients in care between 2017 and 2021 whose last available HIV RNA level was below 100 copies/ml (the percentage without HIV RNA measurements was 1.4% in 2017, 1.2% in 2018, 1.1% in 2019, 3.0% in 2020, and 2.2% in 2021). This annual percentage per centre is given in *Figure 7.10*, which again shows relatively high percentages of this indicator with little variation over the past five years. The median percentage was 97% (range 93–99%) in 2020 and 97% (range 92–99%) in 2021.

Figure 7.10: The annual percentage of all patients in care between 2017 and 2021 who had an HIV RNA level <100 copies/ml.



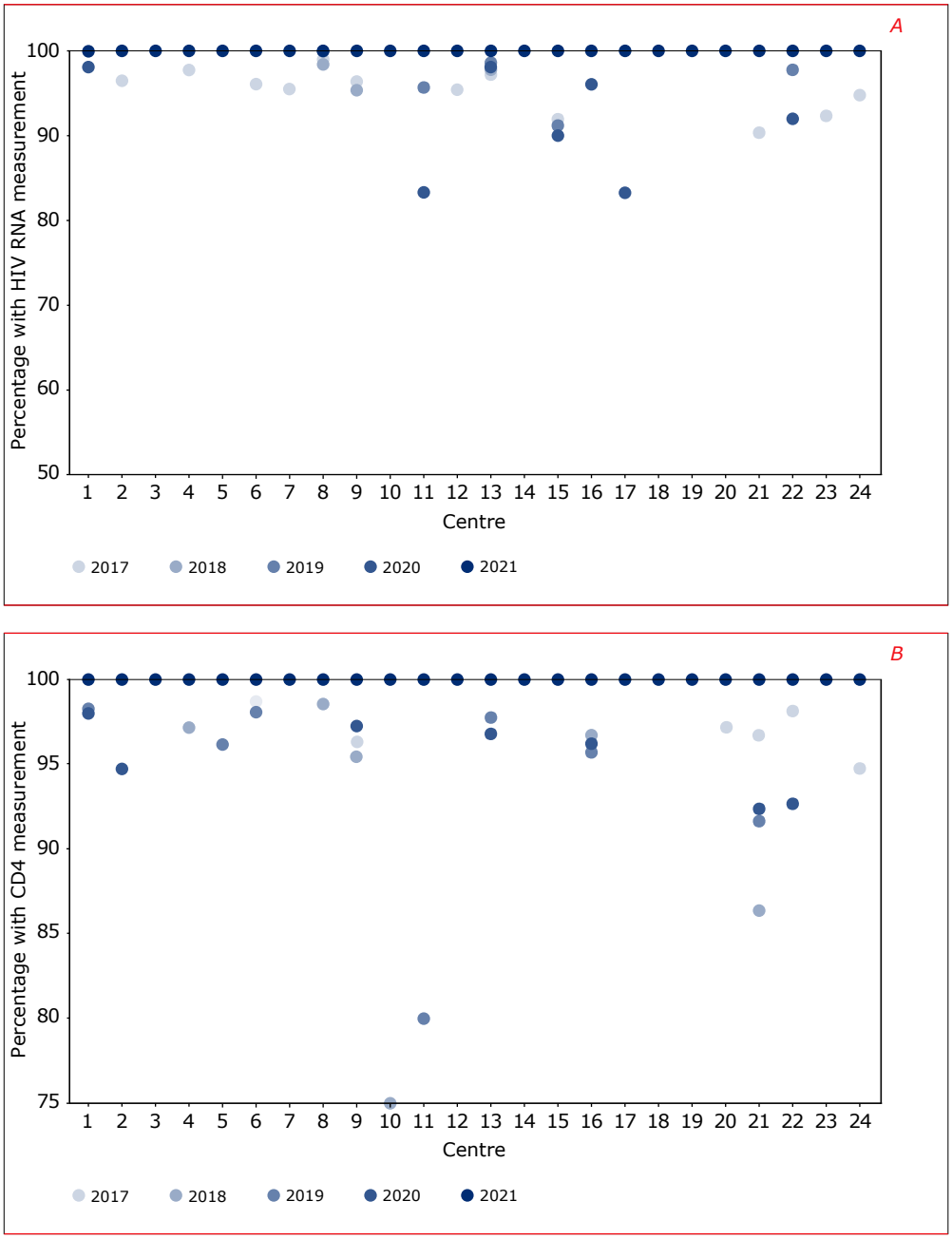
Legend: Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.

Process indicators

Prior to starting ART

Process indicators were evaluated in treatment-naïve patients who newly started ART. The annual percentages of patients who were tested for plasma HIV RNA or CD4 cell count within the six months prior to, or the one month following ART initiation are given per centre in *Figure 7.11A* (for plasma HIV RNA) and *Figure 7.11B* (for CD4 cell count). These percentages have been above 95% for most centres over the past five years. The median percentages tested for plasma HIV RNA were 100% (range 83–100%) in 2020 and 100% (range 100–100%) in 2021, and the median percentages tested for CD4 cell count were 100% (range 80–100%) in 2020 and 100% (range 100–100%) in 2021. For most centres, there were no differences in percentages between 2021 and 2019.

Figure 7.11: *The annual percentage of patients newly initiating combination antiretroviral therapy (ART) between 2017 and 2021 who had (A) a measurement of plasma HIV RNA or (B) CD4 cell count within the six months prior to initiating ART, or the one month following ART initiation.*

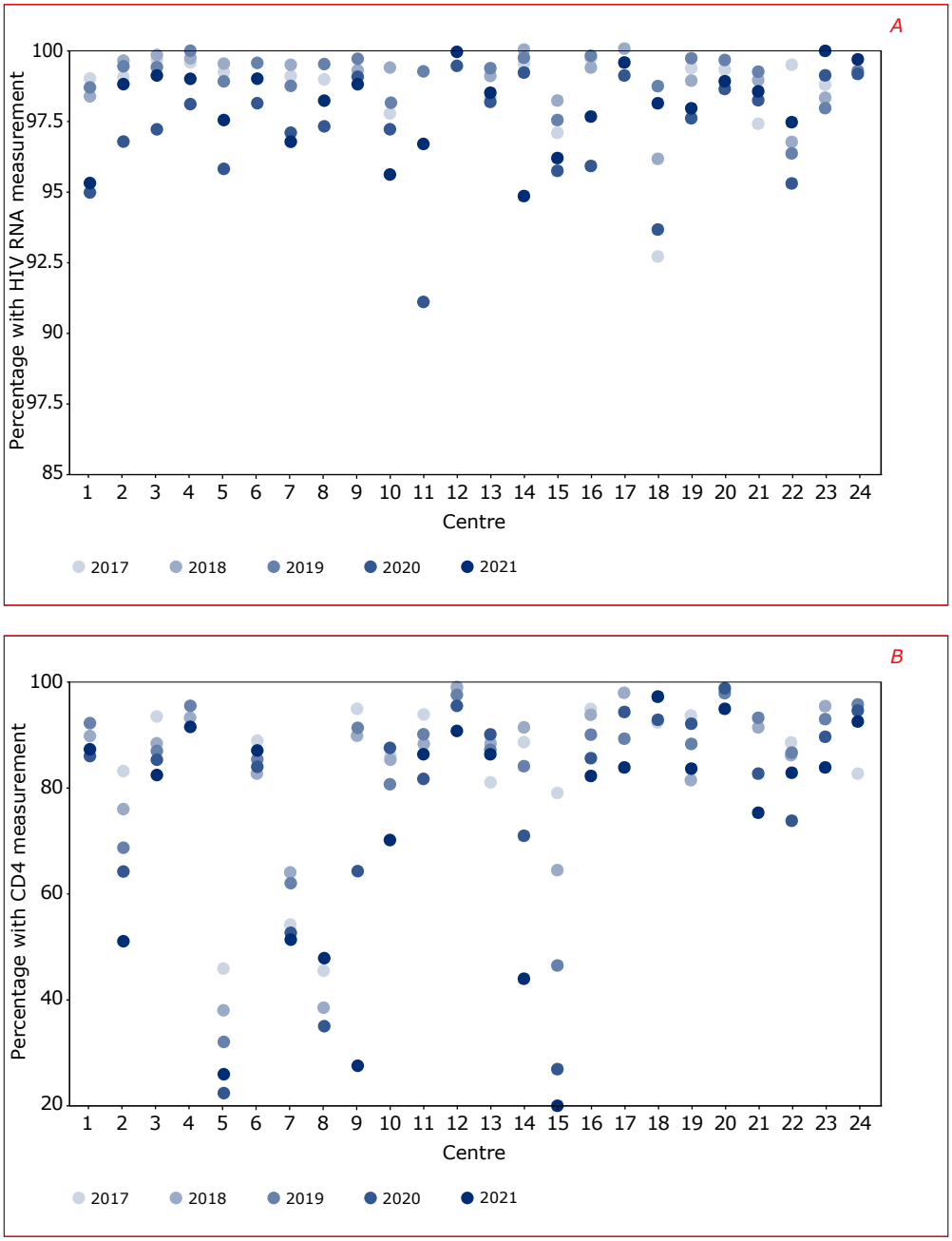


Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

While in care

Process indicators were also evaluated for all patients who were in care. The annual percentages of patients who were tested for plasma HIV RNA or CD4 cell count while in care are given per centre in *Figure 7.12A* (for plasma HIV RNA) and *Figure 7.12B* (for CD4 cell count). These percentages have varied widely for some centres over the past five years, particularly in relation to CD4 cell count testing. The median percentages tested for plasma HIV RNA were 98% (range 91–99%) in 2020 and 98% (range 95–100%) in 2021, and the percentages tested for CD4 cell count were 86% (range 23–99%) in 2020 and 83% (range 19–98%) in 2021. For almost all centres, the percentages between 2021 and 2019 were comparable.

Figure 7.12: *The annual percentage of all patients in care between 2017 and 2021 who had (A) a measurement of plasma HIV RNA or (B) CD4 cell count.*



Legend: *Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 7.1.*

Centre performance

As reported in earlier studies, both the number of patients in care (i.e., the centre 'volume'), and the patient characteristics of a given centre (i.e., the patient 'mix'), may have an impact on the reported indicators[3,4,5,6].

Regarding centre volume, a smaller number of patients in an HIV treatment centre increases the chance that an indicator is more variable. When this occurs, it is difficult to distinguish whether a low-level indicator is the result of performing below expectations or having excessive variation. For this reason, we compare each centre's indicator to the national average and provide statistical guidance as to whether a given centre falls below the national average. This assessment depends on the number of patients included when calculating the indicator (an overview of this method is provided in *Box 7.3*). Given that statistical interpretation is unreliable when centre sizes are small, indicators whose focus population contains more than 40 patients have been considered in this analysis.

Regarding patient mix, individual-level factors, such as age and mode of transmission, are known to be associated with several indicators. If performance indicators are different across centres, it could be that the variation in the characteristics of patients attending those centres is driving these differences. We have therefore adjusted all indicators by year of birth and geographical origin/mode of transmission/gender (*Box 7.3*).

For this section, the indicators that we have used (defined in *Box 7.2*), while accounting for the issues described above, are:

- Overall retention for patients in care;
- Overall ART initiation for patients in care;
- Viral suppression while on ART and while in care; and
- HIV RNA and CD4 cell counts while in care.

Only indicators from 2021 were considered in this analysis.

Box 7.3: Funnel plots to compare centres to the national average.

What types of problems occur when evaluating indicators?	
Centres having fewer patients	Centres of a smaller size are expected to have a wider variation in any given indicator. This variation makes it difficult to determine if the indicator is truly higher or lower than expected.
Patient mix	Individual-level factors, such as age and mode of transmission, are known to be associated with several indicators. If performance indicators differ across centres, it could be that the variation in patient characteristics between centres is driving these differences.
How can we account for these problems?	
Evaluating a centre's performance based on its size	We can determine whether the indicator of a centre (as a percentage) is *statistically* different to the national average. This statistical difference is partly determined by the number of individuals used to calculate the indicator.
Adjust for patient mix	We can adjust indicators based on several important features of the centre's patient population, such as year of birth and geographical origin/mode of HIV acquisition/gender (Dutch men who have sex with men [MSM], other than Dutch MSM, Dutch men who exclusively have sex with women [MSW], other than Dutch MSW, Dutch women, and other than Dutch women).

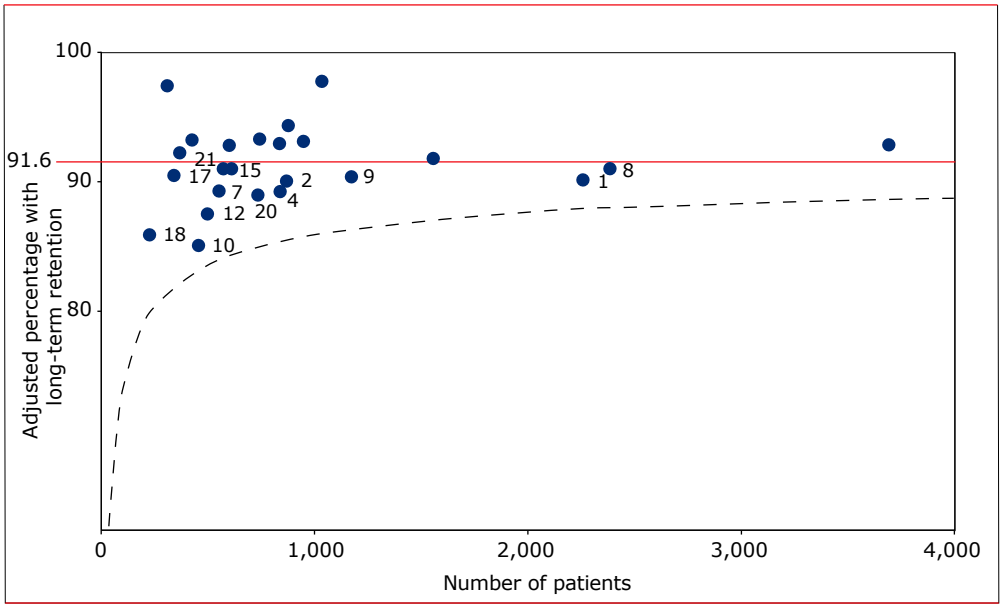
What is a funnel plot? A funnel plot is a graphical depiction that allows us to compare a centre's indicator to the national average. It can help account for the problems listed above. The following are key components of this plot:	
Patient size	The x-axis depicts the number of patients considered in a given indicator. For example, this number could be the total number of patients in care in 2021, etc.
Adjusted %	The y-axis depicts the percentage of patients who have achieved a given indicator. This indicator is adjusted for patient mix.
Centre's indicator	Dots depict each centre's indicator (adjusted %), which are plotted with respect to the number of patients included in the calculation of the indicator.
Comparison to the national average	A solid line depicts the national average. We can create boundaries that indicate (i) the highest indicator level a centre should achieve based on what we statistically expect from the national average ("upper" boundary), or (ii) the lowest indicator level a centre should achieve based on what we statistically expect from the national average ("lower" boundary). These boundaries make the form of a "funnel". The calculation of these boundaries is based on a statistical difference (±2 standard deviations) from the national average.
How is a funnel plot interpreted?	
When is an indicator lower than the national average?	If the centre's indicator falls below the "lower" boundary, then the centre has a lower-than-expected indicator compared to the national average.
When is an indicator higher than the national average?	This question will not be answered in this SHM report. The indicators will be high (ranging from 80-99%), making the "upper" boundary difficult to interpret. We will only provide the "lower" boundary.

Outcome indicators

Overall retention in care

Figure 7.13 shows the adjusted percentage of patients in care in 2021 with overall retention in care per centre. The median adjusted percentage across centres was 91% (range 85–98%). All centres had adjusted percentages of overall retention within the expected range, when compared to the national level.

Figure 7.13: *Overall retention in care; in other words, patients in care who had a documented visit in 2021. The percentage with overall retention in care has been adjusted for patient mix and is plotted as a function of the number of patients who entered care.*

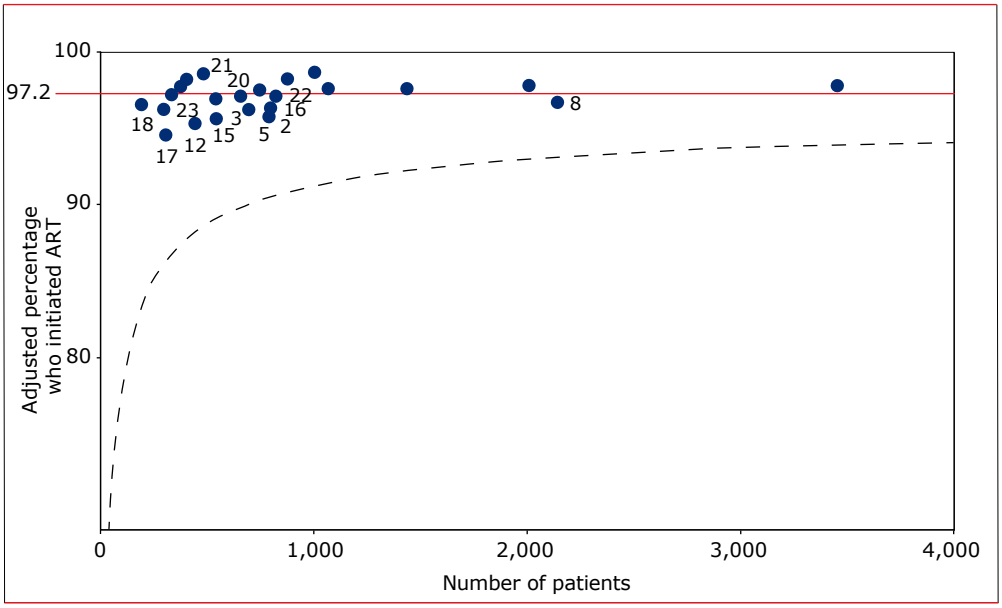


Legend: *Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 7.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 7.3).*

Overall initiation of ART in care

Figure 7.14 shows, per centre, the adjusted percentage of patients in care in 2021 who had ever initiated ART. The median adjusted percentage across centres was 97% (range 95–99%). All centres had adjusted percentages of overall ART initiation within the expected range, when compared to the national level.

Figure 7.14: The percentage of patients in care in 2021 who ever initiated combination antiretroviral therapy (ART). The percentage of overall ART initiation has been adjusted for patient mix and is plotted as a function of the number of patients still in care in 2021.

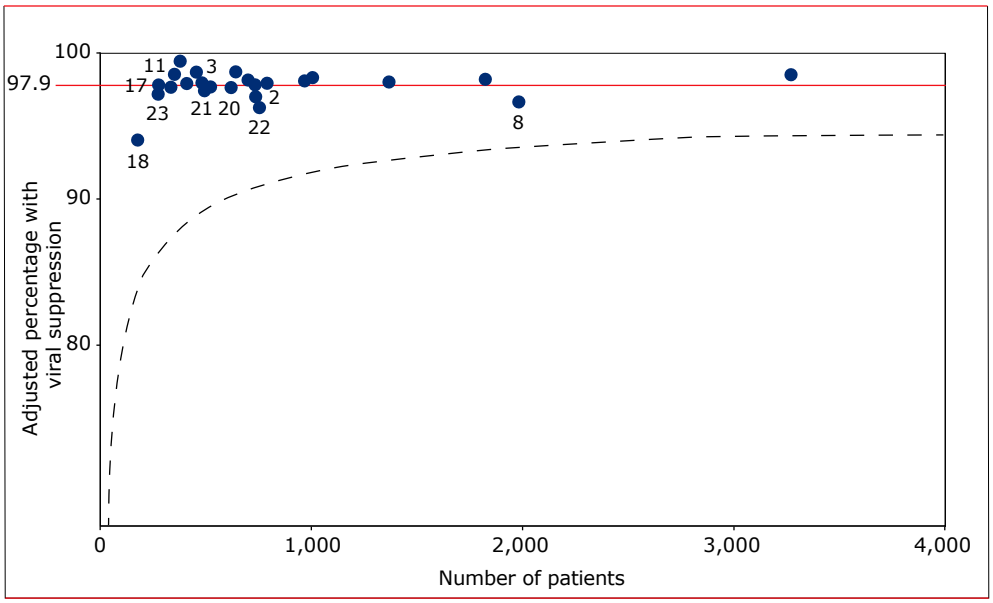


Legend: Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 7.1. The "lower" boundary of expected percentage initiating ART (as compared to the national average) is indicated with a dashed line (Box 7.3).

Viral suppression

Figure 7.15 shows, per treatment centre, the adjusted percentage of patients on ART in 2021 who had a plasma HIV RNA viral load below 100 copies/ml (i.e., viral suppression while on ART). It illustrates the limited variation across centres of different patient volume in 2021. The median adjusted percentage across centres was 98% (range 94–99%). All centres had adjusted percentages within the expected range when compared to the national level.

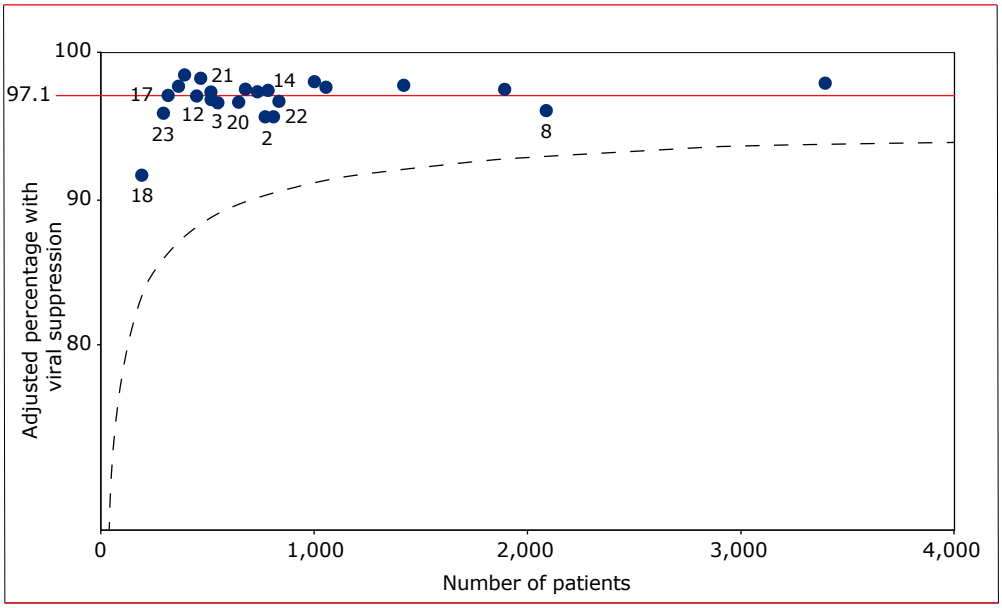
Figure 7.15: *The percentage of all patients on combination antiretroviral therapy (ART) for at least six months in 2021 who had an HIV RNA level <100 copies/ml. The percentage of individuals with viral suppression has been adjusted for patient mix and is plotted as a function of the number of patients in care in 2021 who had been on ART for at least six months.*



Legend: *Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 7.1. The "lower" boundary of expected percentage with viral suppression (as compared to the national average) is indicated with a dashed line (Box 7.3).*

Figure 7.16 shows, per treatment centre, the adjusted percentage of patients in care in 2021 who had a plasma HIV RNA viral load below 100 copies/ml (i.e., viral suppression while in care). The median adjusted percentage across centres was 97% (range 92–99%), with slightly more variation across centres of different patient volume than for the indicator 'viral suppression while on ART'. All centres had adjusted percentages within the expected range when compared to the national level.

Figure 7.16: The percentage of all patients in care in 2021 who had an HIV RNA level <100 copies/ml. The percentage of individuals with viral suppression has been adjusted for patient mix and is plotted as a function of the number of patients in care in 2021.



Legend: Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 7.1. The "lower" boundary of expected percentage with viral suppression (as compared to the national average) is indicated with a dashed line (Box 7.3).

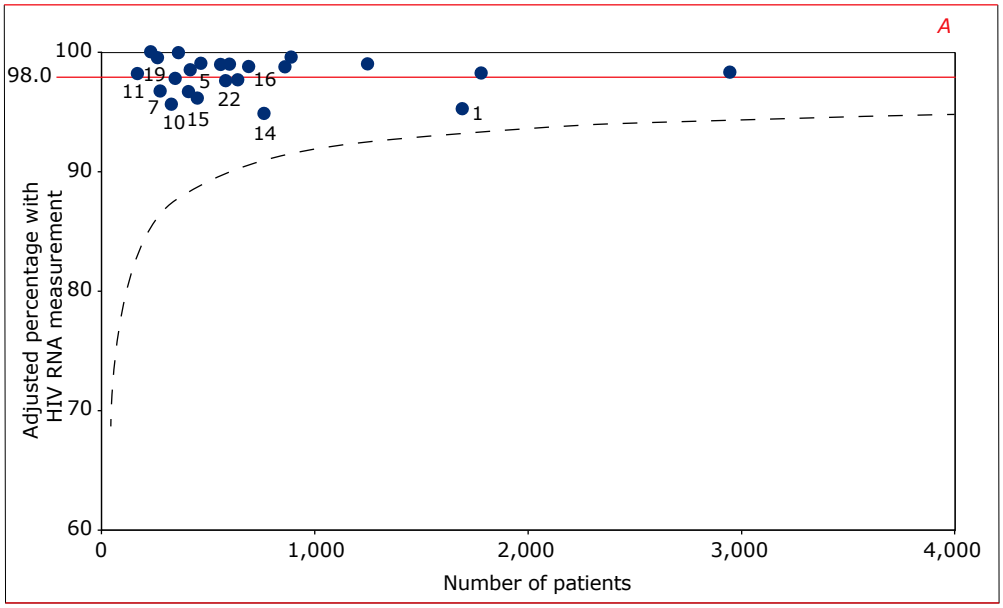
Process indicators

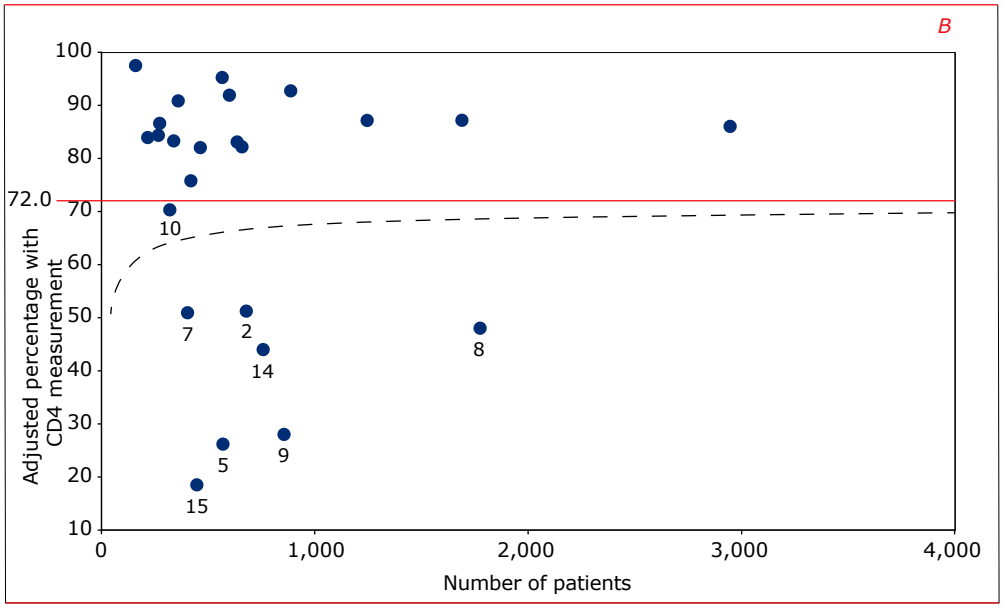
While in care

Process indicators were evaluated in patients who were in care in 2021. *Figure 7.17A and Figure 7.17B* show the across-centre variation in adjusted percentages of patients who had plasma HIV RNA or CD4 cell count measurements, respectively. Across centres, the median adjusted percentage of individuals tested for plasma HIV RNA was 98% (range 95–100%), with only slight variation observed across centres of different patient volume. All centres had adjusted percentages of plasma HIV RNA tested within the expected range when compared to the national level (*Figure 7.17A*).

Across centres, the median adjusted percentage of individuals tested for CD4 cell count was 83% (range 18–98%), with large variation observed across centres of different patient volume. Seven centres of varying patient volume had a lower-than-expected percentage of patients in care measured for CD4 cell count in 2021. However, some of the variation in this indicator could be due to differences in the CD4 measurement protocols between centres. It should be pointed out that there is no specific recommended frequency for CD4 cell count monitoring among patients with a CD4 level above 350 cells/mm^3 in the national guidelines[1].

Figure 7.17: The percentage of all patients in care in 2021 who had (A) a measurement of plasma HIV RNA or (B) a CD4 cell count. The percentages have been adjusted for patient mix and are plotted as a function of the number of patients in care in 2021.





Legend: Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 7.1. The "lower" boundary of expected percentage with measurements (as compared to the national average) is indicated with a dashed line (Box 7.3).

Indicators according to patient mix

In the previous analysis on centre performance, we accounted for the patient mix by adjusting each indicator using the six geographical origin/mode of transmission/gender groups. However, it remains difficult to determine whether indicators per centre are different across groups. We therefore explored centre-level differences for several indicators while stratifying on patient mix and accounting for age differences between groups.

For this section, the indicators that we have used (defined in *Box 7.2*) are:

- Overall retention for patients in care;
- Overall ART initiation for patients in care;
- Viral suppression while on ART and while in care; and
- HIV RNA and CD4 cell counts while in care.

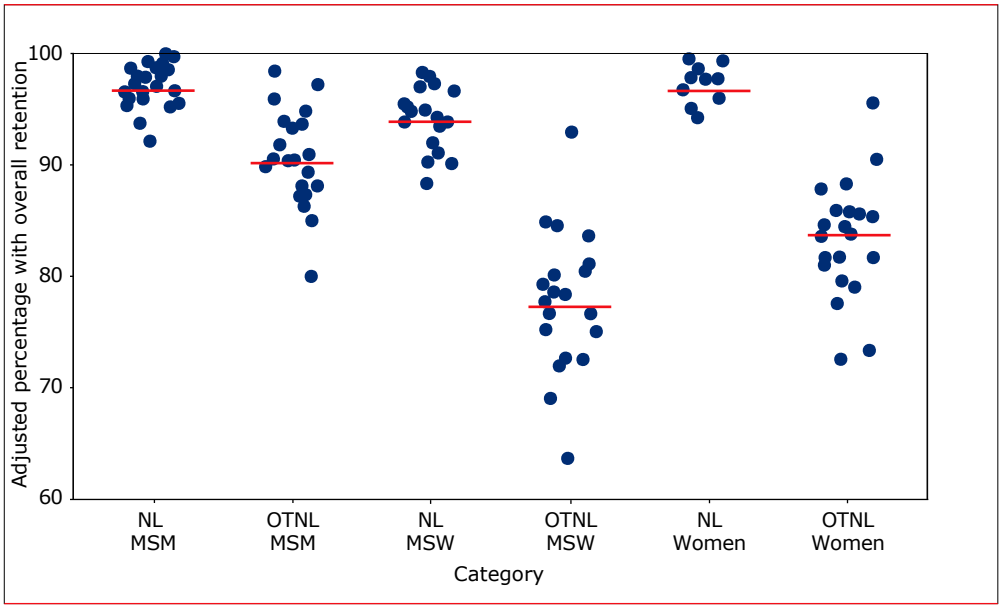
Given that statistical interpretation is unreliable when centre sizes are small, only centres where the focus population contains more than 40 patients have been considered in this analysis. In addition, only indicators from 2021 are considered.

Outcome indicators

Overall retention in care

Figure 7.18 shows the adjusted percentage of patients in care in 2021 with overall retention in care per centre, according to patient mix groups. The highest median percentages across centres were observed in Dutch MSM (97%, range 94–99%) and Dutch women (97%, range 96–98%), followed by Dutch MSW (94%, range 89–96%), and other than Dutch MSM (90%, range 82–97%). Two groups had median percentages below 90%: other than Dutch women (median 84%, range 74-95%) and other than Dutch MSW (median 77%, range 65-93%).

Figure 7.18: Overall retention in care; in other words, patients in care who had a documented visit in 2021. The percentage has been adjusted for patient age.



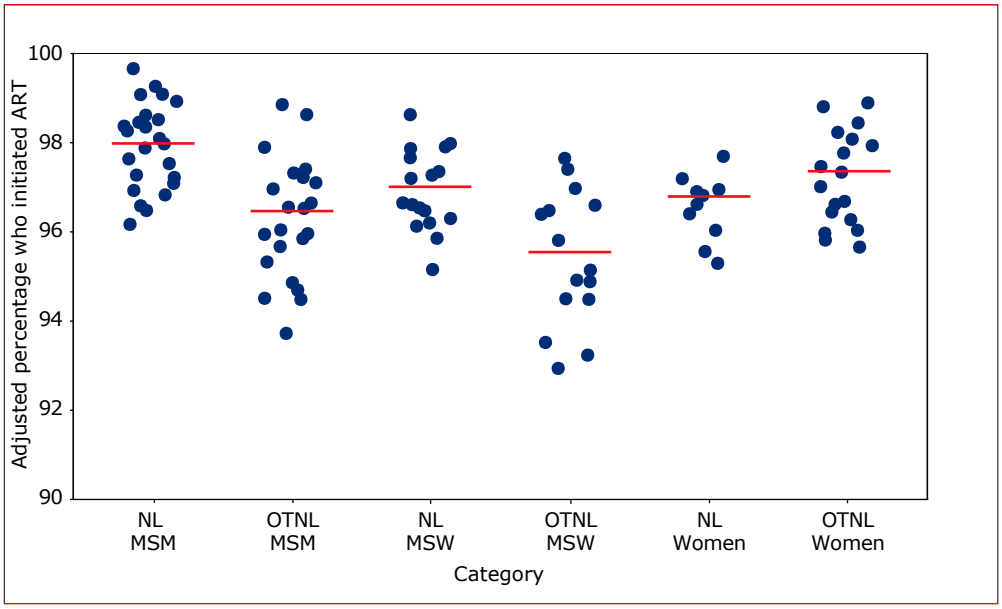
Legend: The median adjusted percentage across centres is indicated with a solid line for each patient mix group. MSM = men who have sex with men; MSW = men who exclusively have sex with women; NL = Dutch; OTNL = other than Dutch.

Overall initiation of ART in care

Figure 7.19 shows the adjusted percentage of patients in care in 2021 who ever initiated ART per centre, according to patient mix groups. All median percentages were above 95% for each of the patient mix groups. These median percentages were:

- 98% (range 96–99%) in Dutch MSM
- 96% (range 94–98%) in other than Dutch MSM
- 97% (range 95–98%) in Dutch MSW
- 96% (range 93–98%) in other than Dutch MSW
- 97% (range 95–97%) in Dutch women
- 97% (range 96–99%) in other than Dutch women

Figure 7.19: The percentage of patients in care in 2021 who ever initiated combination antiretroviral therapy (ART). The percentage has been adjusted for patient age.



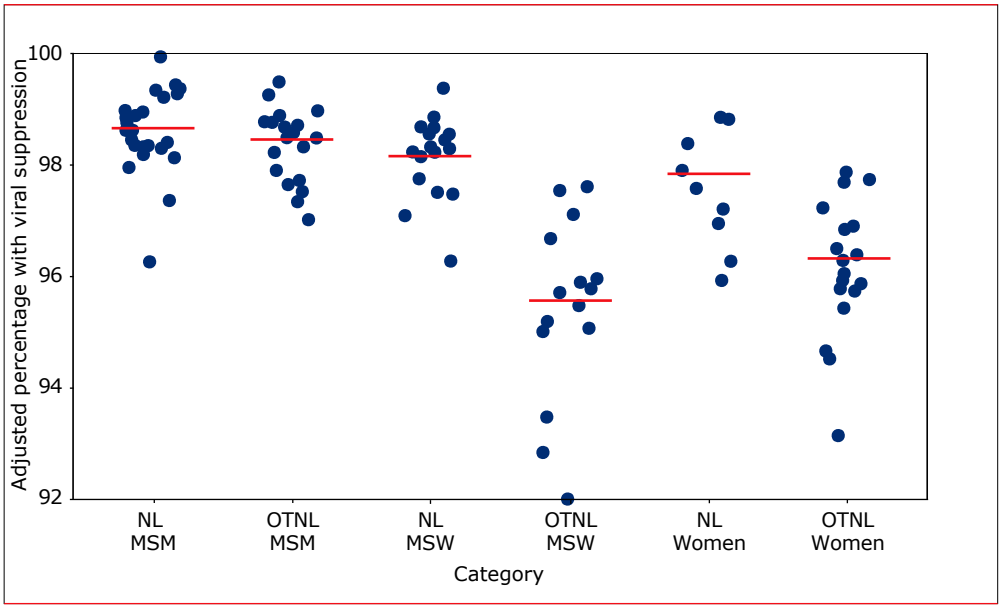
Legend: The median adjusted percentage across centres is indicated with a solid line for each patient mix group. MSM = men who have sex with men; MSW = men who exclusively have sex with women; NL = Dutch; OTNL = other than Dutch.

Viral suppression

Figure 7.20 shows the adjusted percentage of patients on ART in 2021 who had a plasma HIV RNA viral load below 100 copies/ml (i.e., viral suppression while on ART) per treatment centre, according to patient mix groups. All median percentages were above 95% for each of the patient mix groups. These median percentages were:

- 99% (range 96–100%) in Dutch MSM
- 98% (range 97–100%) in other than Dutch MSM
- 98% (range 97–99%) in Dutch MSW
- 96% (range 92–97%) in other than Dutch MSW
- 98% (range 96–99%) in Dutch women
- 96% (range 94–98%) in other than Dutch women

Figure 7.20: The percentage of all patients on combination antiretroviral therapy (ART) for at least six months in 2021 who had an HIV RNA level below 100 copies/ml. The percentage has been adjusted for patient age.

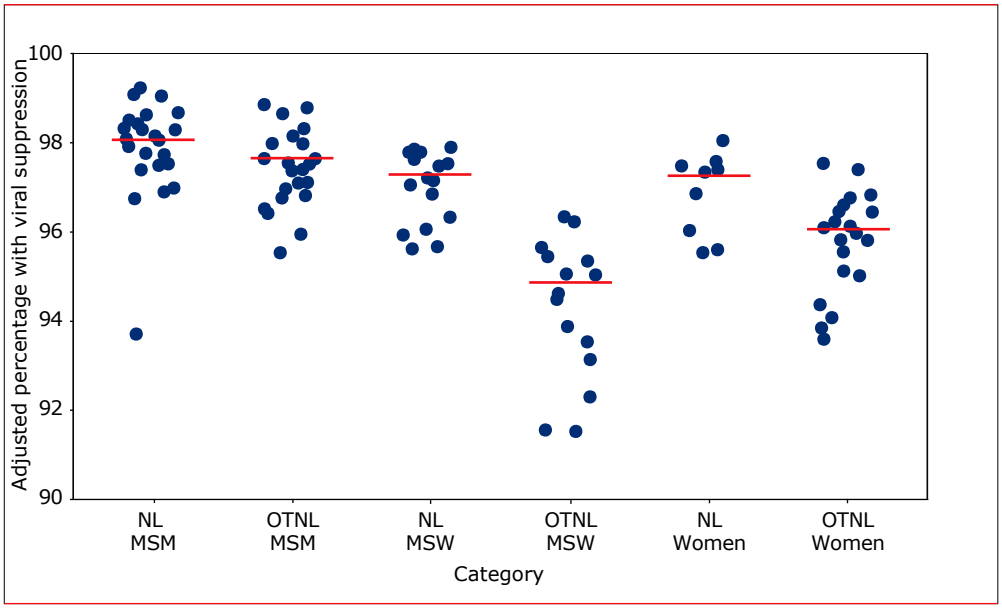


Legend: The median adjusted percentage across centres is indicated with a solid line for each patient mix group. MSM = men who have sex with men; MSW = men who exclusively have sex with women; NL = Dutch; OTNL = other than Dutch.

Figure 7.21 shows the adjusted percentage of patients in care in 2021 who had a plasma HIV RNA viral load below 100 copies/ml (i.e., viral suppression while in care) per treatment centre, according to patient mix groups. All median percentages were again above 95% for each of the patient mix groups. These median percentages were:

- 98% (range 94–99%) in Dutch MSM
- 98% (range 96–99%) in other than Dutch MSM
- 97% (range 95–98%) in Dutch MSW
- 95% (range 92–96%) in other than Dutch MSW
- 97% (range 95–98%) in Dutch women
- 96% (range 94–97%) in other than Dutch women

Figure 7.21: The percentage of all patients in care in 2021 who had an HIV RNA level <100 copies/ml. The percentage has been adjusted for patient age.



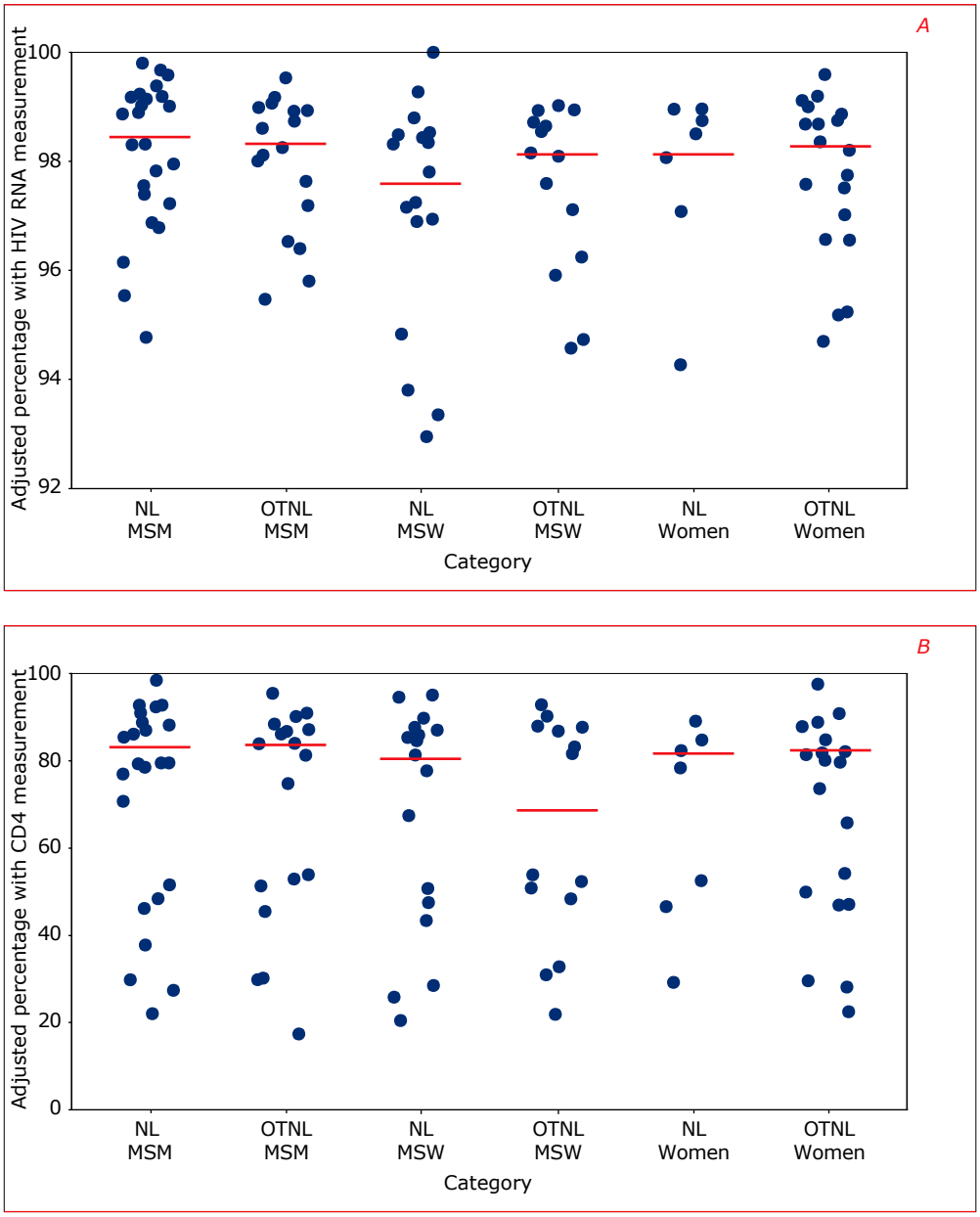
Legend: The median adjusted percentage across centres is indicated with a solid line for each patient mix group. MSM = men who have sex with men; MSW = men who exclusively have sex with women; NL = Dutch; OTNL = other than Dutch.

Process indicators

While in care

Process indicators were evaluated for patients who were in care in 2021. *Figure 7.22A and Figure 7.22B* show the across-centre variation, in adjusted percentages, of those who had plasma HIV RNA and CD4 cell count measurements, respectively, according to patient mix groups. All median adjusted percentages for HIV RNA measurements were high across patient mix groups, with the highest in Dutch MSM (99%, range 95–100%) and the lowest in Dutch MSW (98%, range 93–100%). All adjusted percentages for CD4 cell count measurements were highly variable across patient mix groups, with median percentages ranging from 83% (range 18–98%) in Dutch MSW and 69% in other than Dutch MSW (range 20–96%).

Figure 7.22: The percentage of all patients in care in 2021 who had (A) a measurement of plasma HIV RNA or (B) CD4 cell count. The percentage has been adjusted for patient age.



Legend: The median adjusted percentage across centres is indicated with a solid line for each patient mix group. MSM = men who have sex with men; MSW = men who exclusively have sex with women; NL = Dutch; OTNL = other than Dutch.

Indicators after centre closure

In 2018, two official HIV treatment centres closed (MC Slotervaart, Amsterdam, and MC Zuiderzee, Lelystad). At the time of closure, 662 patients were still in care at these centres. Of these patients:

- 574 (87%) transferred to another HIV treatment centre in the Netherlands (560 had a clinical visit in 2021);
- 15 (2%) moved abroad;
- 17 (3%) were lost to care;
- 36 (5%) died; and
- 20 (3%) patients had an unknown care status at the time of this analysis (i.e., their current status was not in the database).

The percentages who moved abroad or died are comparable to those recorded for the entire adult HIV-1 positive population in SHM in 2021 (*Chapter 1*). The slightly higher percentage of those lost to care could be due to an administrative backlog in re-registering those patients who have transferred to another centre.

The indicators most relevant to the group of patients who transferred care from a closed centre to another HIV treatment centre are:

- The percentage of all people living with HIV who ever initiated ART and were still in care in 2021;
- The percentage of people on ART for at least six months in 2021 with a plasma HIV RNA level below 100 copies/ml; and
- The percentage of all people living with HIV in care in 2021 with a plasma HIV RNA level below 100 copies/ml.

Table 7.1 summarises these indicators for individuals whose care was transferred from a closed centre, and compares them to the median indicators across centres: all were within range.

Table 7.1: Indicators in individuals whose care was transferred from a closed centre to another HIV treatment centre.

Indicator *(Box 7.2)*	Individuals transferred from a closed centre (n=574)	Median indicators (range) across all centres in the Netherlands in 2021
Overall ART initiation and still in care in 2021	99%	97% (95–99%)
Viral suppression while on ART in 2021	99%	98% (94–99%)
Viral suppression while in care in 2021	99%	97% (92–99%)

Key findings and conclusions

The most important findings of this comparison of quality indicators between HIV treatment centres in the Netherlands are as follows:

- The number of newly HIV-diagnosed individuals entering care has been slowly decreasing for the vast majority of centres, which is in line with the national trend of fewer newly diagnosed HIV infections.
- After exclusion of patients who either died or moved abroad, short-term retention has been high for individuals entering care, and the overall retention has witnessed a median increase of 11% over the past five years. No centre had an overall retention rate lower than the national average when adjusting for patient mix. Nevertheless, the overall retention rate for other than Dutch MSW and women was considerably lower than other groups after adjusting for age. The reasons for this finding need to be explored in future research.
- The overall percentage of individuals retained in care in 2019 was not substantially different from that of 2021 – the year after the beginning of the COVID-19 pandemic. This finding suggests that the COVID-19 pandemic had no major effect on current retention in care.
- The COVID-19 pandemic had drastically shifted how consultations were conducted at HIV treatment centres in 2020, with most centres opting for consultations via telephone or email over physical consultations. These trends continued in 2021. Nevertheless, the percentage of patients opting for another type of consultation decreased between 2020 and 2021.
- The percentage of patients initiating ART within six months of newly entering care remained high for those who entered care between 2017 and 2020. Nevertheless, some centres saw a considerable decline in this indicator for individuals entering care in 2019 and 2020. The overall percentage of patients in care who ever initiated ART has been slowly increasing over the past five years. In fact, no centre had an overall ART initiation figure lower than expected from the national average when adjusting for patient mix.

- Viral suppression rates in the first six months on ART, during longer-term use of ART, and while in care have been high across all HIV treatment centres in the Netherlands over the past five years. There was little variation in the percentage with viral suppression while on ART and in care across centres after adjusting for patient mix.
- The percentage of individuals with HIV RNA measurements prior to ART, or while in care, has been high across centres over the past five years, even during the COVID-19 pandemic in 2020 and 2021. However, several centres had a much lower-than-expected proportion with CD4 measurements while in care in 2021, as compared to the national average and after adjusting for patient mix.
- The ART and viral suppression indicators for individuals who were originally registered with the two HIV treatment centres that closed do not appear to have been affected by the transfer of their care to another HIV treatment centre.

The wide range of indicators used in these analyses offers broad coverage of various aspects of HIV care and provides insight into care provision at the different treatment centres. These analyses also provide information on whether some of the 2022 targets of the Dutch National Action Plan for STIs, HIV and Sexual Health (*Nationaal Actieplan soa, hiv en seksuele gezondheid: 2017-2022*) will be met at the centre level. Nonetheless, data reliability remains an important issue, and it should be recognised that some of the reported variations may be due to missing data. Other important indicators reflecting the quality of care, such as quality of life, reduction in stigma, and discrimination, are difficult to obtain from patient files, and are therefore not collected in the SHM database.

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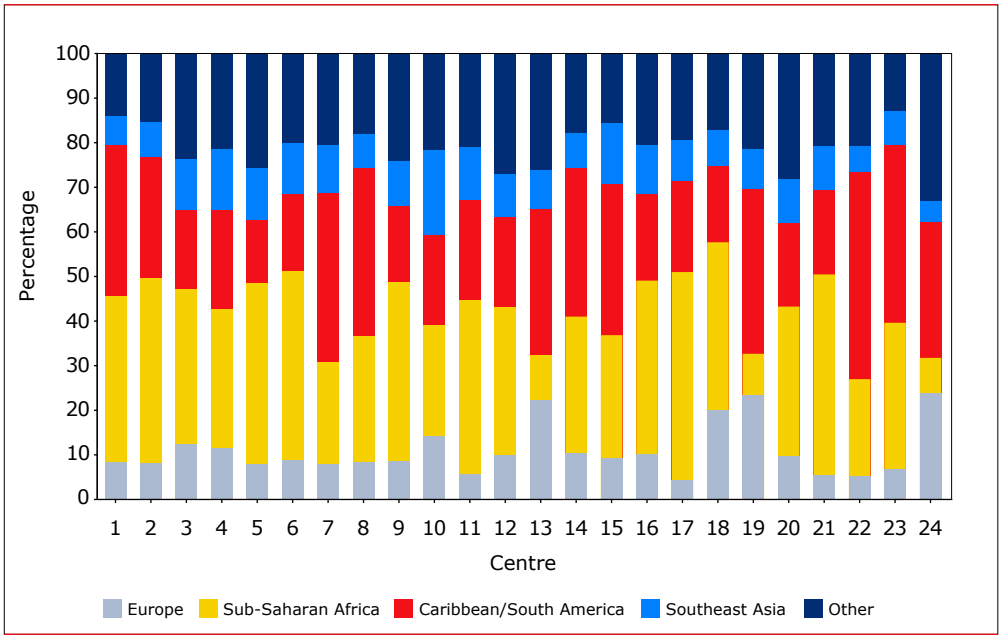
Appendix

Figure 7.A: Distribution of region of origin for other than Dutch patients in care in 2021 in the Netherlands.



Note: Percentage of individuals per centre is given in the bar chart according to region of origin.