Human Immunodeficiency Virus (HIV)
Infection in the Netherlands

HIV Monitoring Report

2020

HIV Monitoring
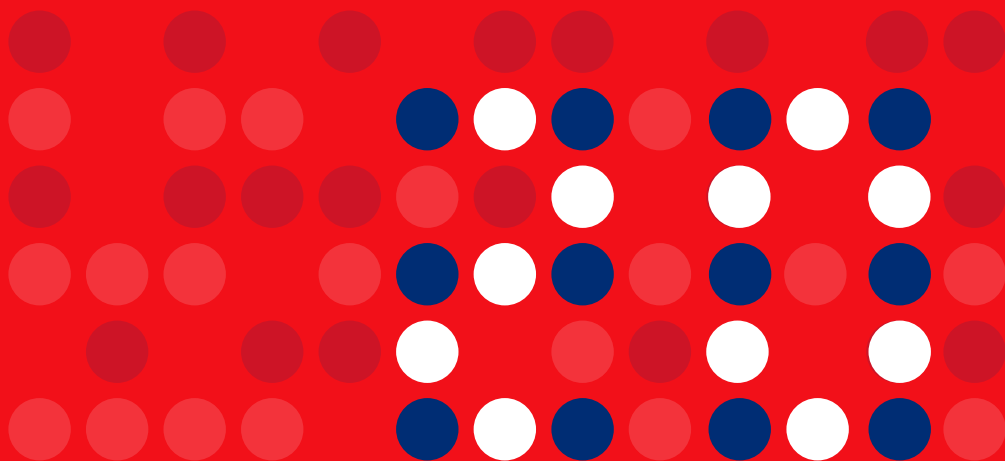
7. Quality of care

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Introduction

One of SHM's missions is to contribute to the quality of HIV care in the Netherlands. With the collection of pseudonymised data from HIV-positive individuals in outpatient care in HIV treatment centres, SHM provides a nationwide overview of the outcome of care for individuals living with HIV. There were 26 officially-acknowledged HIV treatment centres for most of 2018 and 24 centres in 2019. This unique overview allows SHM to facilitate assessment of the quality of HIV care in the Netherlands.

In general, HIV treatment guidelines are intended to not only support physicians in providing optimal health 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 HIV-positive people in the Netherlands[1]. Using these guidelines as a basis, we have defined a set of indicators, which are used to explore the quality of care in Dutch HIV treatment centres, and gain insight into potential variation in outpatient care between HIV treatment centres.

Box 7.1: Definitions used in this chapter.

Diagnosis	The moment an individual is newly diagnosed with an HIV infection. The time of diagnosis can be weeks, months, or years after infection.
Entry into care	The moment an HIV-positive individual is first seen for care in an HIV treatment centre, which is usually within a few weeks of HIV diagnosis.
Registration	The moment an HIV-positive individual in care is notified to SHM by their treating physician or nurse, and is registered in the SHM database. Registration is usually within a few months of entering care, but can take longer. Collection of demographic and clinical data from the time of HIV diagnosis can only be done after an HIV-positive individual is registered with SHM.
Patient	An individual living with HIV who is receiving or has received medical care at an HIV treatment centre. This term has been specifically used in Chapter 7 to denote the role of the individual in a medical context.

Volume indicator	The number of people newly entering care for the first time in 2018 and 2019 for each treatment centre.
Outcome indicators *Retention in care*	I. Short-term retention: The percentage of people who entered care for the first time after being diagnosed with HIV in one of the HIV treatment centres in 2016 and 2017, and who were still alive and in care at least 18 months after entering care. Patients who died or moved abroad were excluded from this indicator. II. Long-term retention in care in 2019: the percentage of all individuals who entered care during the period 2014-2017, did not move abroad or die, and had a documented clinical visit in 2019.
Initiation of cART	I. Start of combination antiretroviral therapy (cART) within six months of entry into care in 2017 and 2018. II. The percentage of people who initiated cART and were still in care in 2019.
Viral suppression	I. The percentage of treatment-naive people with a plasma HIV RNA level <400 copies/ml at six months after starting cART in 2018 (this definition of viral suppression is a requirement of the national certification process for HIV treatment centres in the Netherlands[2]). II. The percentage of all HIV-positive people on cART for at least six months, in care in 2018 and 2019, with a plasma HIV RNA level <100 copies/ml. III. The percentage of all HIV-positive people in care in 2018 and 2019 with a plasma HIV RNA level <100 copies/ml.
Process indicators *Prior to cART initiation*	The percentage of people newly entering HIV care in 2017 and 2018 for whom data were available on CD4 count and plasma HIV RNA within six months of entering care.
Following cART initiation	The percentage of people initiating cART in 2017 and 2018 for whom CD4 cell count and plasma HIV RNA were measured at least once within 13 months of cART initiation.

Box 7.2: Funnel plots to compare centres to the national average.

What types of problems occur when evaluating indicators?	
Centres treating fewer patients	Centres of smaller size are expected to have wider variation for 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 are different 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], Non-Dutch MSM, Dutch men who exclusively have sex with women [MSW], Non-Dutch MSW, Dutch women, and non-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 entering care in 2017, the total number of patients in care in 2019, 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.
Is it possible to determine a difference with so few patients?	Much like any statistical test, inference can be difficult when patient sizes are too small. If a centre size is small, the difference needed to find a statistically lower indicator would be very large. This means that the "lower" boundary could reach below 50%, which is far from a clinically meaningful indicator. In this report, we do not state if a centre's indicator is below the national average when there are fewer than 40 patients included.

Methods

The indicators selected for this analysis are classified as volume, outcome, or process indicators (*Box 7.1*). They were derived from formal NVHB recommendations that, in general, follow the United States Department of Health and Human Services (DHHS) HIV/AIDS practice guidelines[1].

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 some HIV treatment centres could result in less informative percentages, as a single deviating score on an indicator can further increase the variation for that indicator. 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 7.2*). 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 these centres is driving these differences. We have therefore adjusted all indicators by year of birth and geographical origin/mode of transmission/gender (*Box 7.2*).

Volume indicator

To meet the requirements of the national certification process for HIV treatment centres in the Netherlands (*Harmonisatie Kwaliteitsbeoordeling in de Zorgsector*, HKZ), HIV treatment centres are expected to enrol a minimum of approximately 20 new patients each year. Therefore, as a volume indicator, we have quantified the number of patients newly entering care for the first time each year in 2018 and 2019 for each treatment centre.

Outcome indicators

The outcome indicators include *retention in care*, *initiation of cART* and achievement of *viral suppression*. For the purpose of the current analysis, we have defined short-term and long-term retention in care as follows:

Short-term retention in care: The percentage of those patients who, after being diagnosed with HIV, entered care for the first time in one of the Dutch HIV treatment centres in 2016 and 2017, and who were still alive and in care at least 18 months after entering care. Patients who were known to have died or moved abroad were excluded from this retention-in-care indicator. During the observation

period, approximately 12% of patients switched treatment centres (mainly because of the closure of two treatment centres during 2018); these patients were considered to be retained in care, since they were documented as having remained in care elsewhere, and were not lost to follow up. However, to avoid double counting, they were assigned to their most recent treatment centre.

Long-term retention in care: The percentage of all patients who entered care during the period 2014-17, did not move abroad or die, *and* had a documented clinical visit in 2019. Again, patients switching treatment centres were considered to be retained in care and were assigned to their most recent treatment centre.

Initiation of cART describes: 1) the patients who entered care in 2017 and 2018 and started cART within six months of entry; and 2) the percentage of patients still in care in 2019 who had ever initiated cART.

Viral suppression was assessed by three indicators:
The *first* indicator was defined as the percentage of treatment-naive patients with a plasma HIV RNA level <400 copies/ml at six months after starting cART in 2018. The HIV RNA measurement closest to six months (±three months) after the start of cART was chosen. The target percentage of viral suppression was set at ≥90%. This indicator, developed using the Delphi method, is part of the HKZ certification process and was defined jointly with the NVHB[2] during the development of *Zichtbare Zorg* (Visible Healthcare; ZiZo) indicators and HKZ.

The *second* indicator was the percentage of all HIV-positive patients on cART for at least six months with a plasma HIV RNA level <100 copies/ml. This indicator was calculated for the calendar years 2018 and 2019.

The *third* indicator was the percentage of all HIV-positive patients in care who had a last available HIV RNA level <100 copies/ml. This indicator was also calculated for the calendar years 2018 and 2019.

Process indicators

Process indicators were calculated for two scenarios: prior to starting cART and following cART initiation.

To calculate the process indicators *prior to cART initiation*, we included all patients who entered care in 2017 and 2018. Only patients who entered care for the first time and were in care for at least 12 months were included; patients who switched treatment centres were not counted as newly entering care, as they had already been in care elsewhere. The indicators were defined as the percentage of patients newly entering care in 2017 and 2018 for whom the following measurements were available in the six months after entry into care: CD4 and plasma HIV RNA.

To calculate the process indicators *following cART initiation*, we included patients who had started cART in 2017 and 2018. Of note, patients who had been in care and started cART outside the Netherlands were excluded. The indicators were defined as the percentage of patients for whom the following measurements were recorded at least once within 13 months of their cART initiation: CD4 cell count and plasma HIV RNA.

Results

Patient mix across centres

The characteristics of patients in care in 2019 are described per HIV treatment centre in *Figure 7.1* (patient 'mix'). The largest geographical origin/mode of transmission/gender group observed for almost all centres was Dutch MSM, ranging from 32% to 62% (median = 47%) of patients within centres. There was substantial variation across centres in the other geographical origin/mode of transmission/gender groups: Non-Dutch MSM (median: 16%, range: 6-37%), Dutch MSW (median: 11%, range: 2–16%), Non-Dutch MSW (median: 9%, range: 2–13%), Dutch women (median: 6%, range: 2–10%), and Non-Dutch women (median: 12%, range: 3–24%). The mean within-centre age ranged between 46 to 53 years (median = 50 years).

Figure 7.1: *Description of the patient 'mix' for HIV–positive individuals in care in 2019 in the Netherlands.*
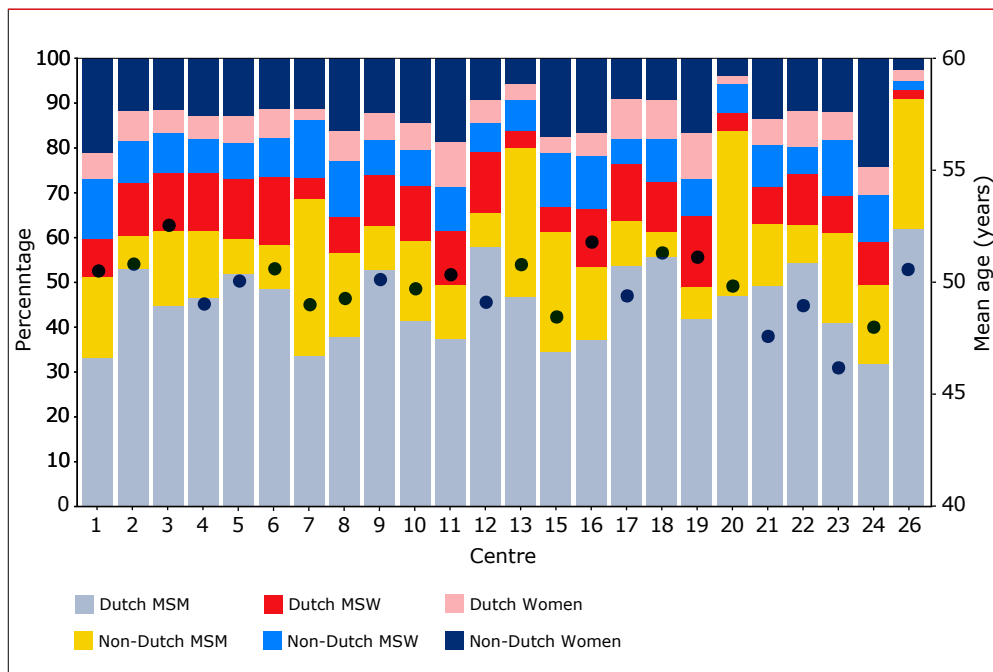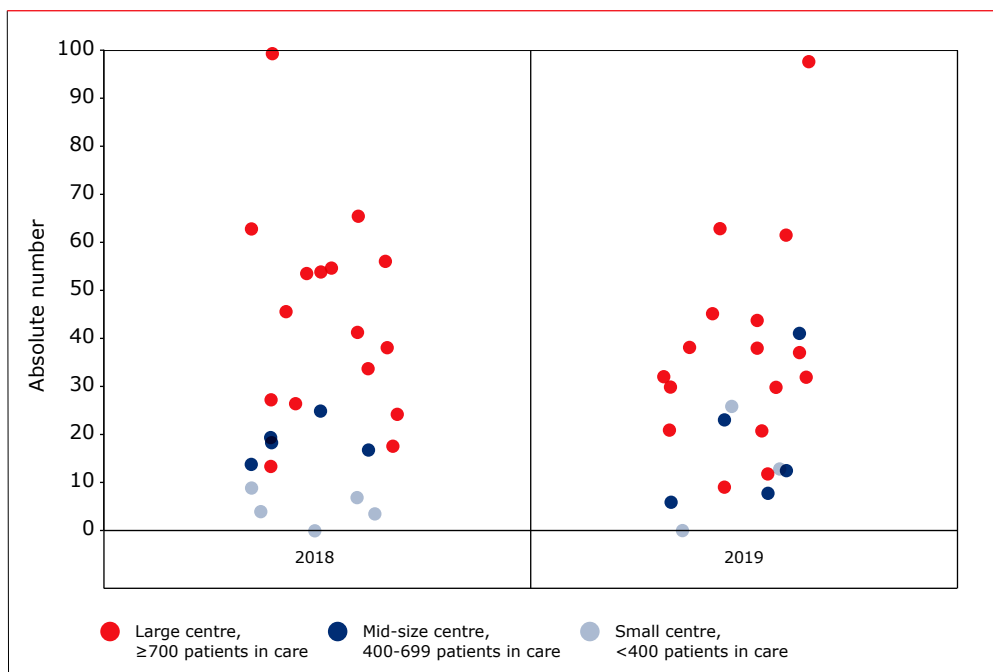

Note: *Percentage of individuals per centre is given in the bar chart according to geographical origin/mode of transmission/gender group. Mean age of patients in care at each centre is given in black dots. Since centres 14 and 25 were closed in 2018, they are not depicted in this figure*
Legend: *MSM=men who have sex with men; MSW=men who exclusively have sex with women.*

Volume indicator

The numbers of patients who newly entered care in 2018 and 2019 across the HIV treatment centres are shown in *Figure 7.2*. The median number was 29 in 2018 and 2019, with a minimum number of five patients in 2018 and three in 2019. In 2019, eight HIV treatment centres had fewer than 20 newly-entering patients and these centres were of small (two), medium (three) and large (three) patient size.

Figure 7.2: Annual number of patients newly entering care per HIV treatment centre in the Netherlands in 2018–2019.

Outcome indicators

Retention in care

Across centres, the median adjusted percentage of individuals with short-term retention was 100% (range = 90–100%) for patients entering care in 2016, and 97% (range = 81–100%) for those entering care in 2017. *Figure 7.3* shows the variation in adjusted percentages of short-term retention in care across treatment centres for patients who entered care in 2016 (*Figure 7.3A*) and 2017 (*Figure 7.3B*). This figure demonstrates that all centres with at least 40 patients entering care during these years had adjusted percentages of short-term retention within the expected range, when compared to the national level.

For all individuals in care as of 2019, the median adjusted percentage of individuals with long-term retention was 92% (range = 76–100%) across centres for patients entering care in 2014. This percentage has increased in subsequent years, with a median percentage retained of 96% (range = 82–100%) for those entering care in 2017. *Figure 7.4* shows the adjusted percentage of individuals in long-term retention in care per centre, by year of entry. Once again, all centres with at least 40 patients entering care in 2014 (*Figure 7.4A*), 2015 (*Figure 7.4B*), 2016 (*Figure 7.4C*), and 2017 (*Figure 7.4D*), had adjusted percentages of long-term retention within the expected range, when compared to the national level.

Figure 7.3: *Short-term retention in care, in other words, 18 months after entering care for those who entered care in A) 2016 and B) 2017. The percentage of individuals retained in care has been adjusted for patient mix and is plotted as a function of the number of patients entered into care.*
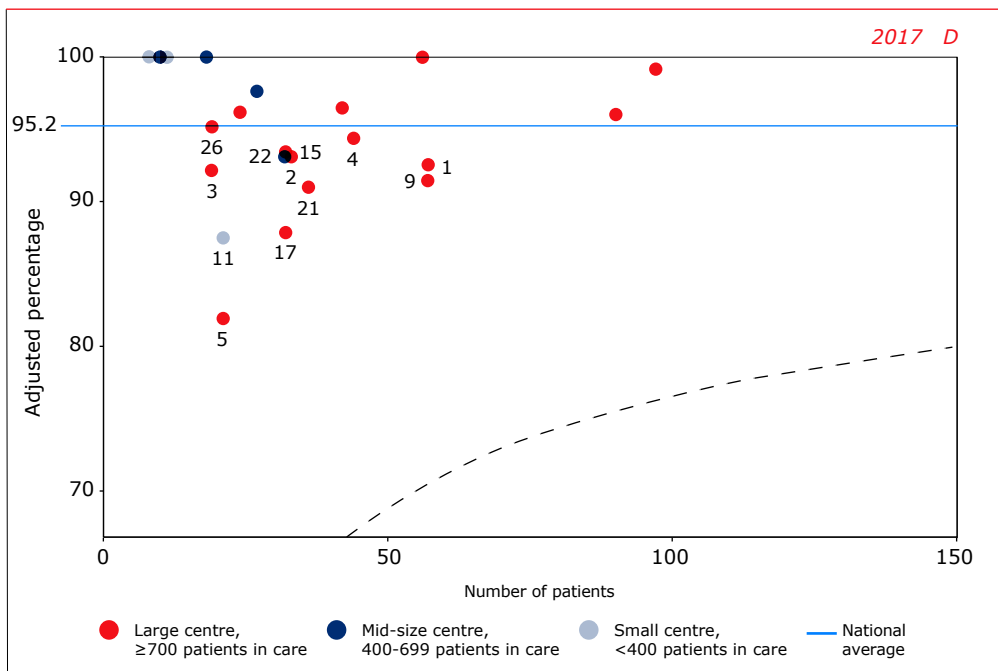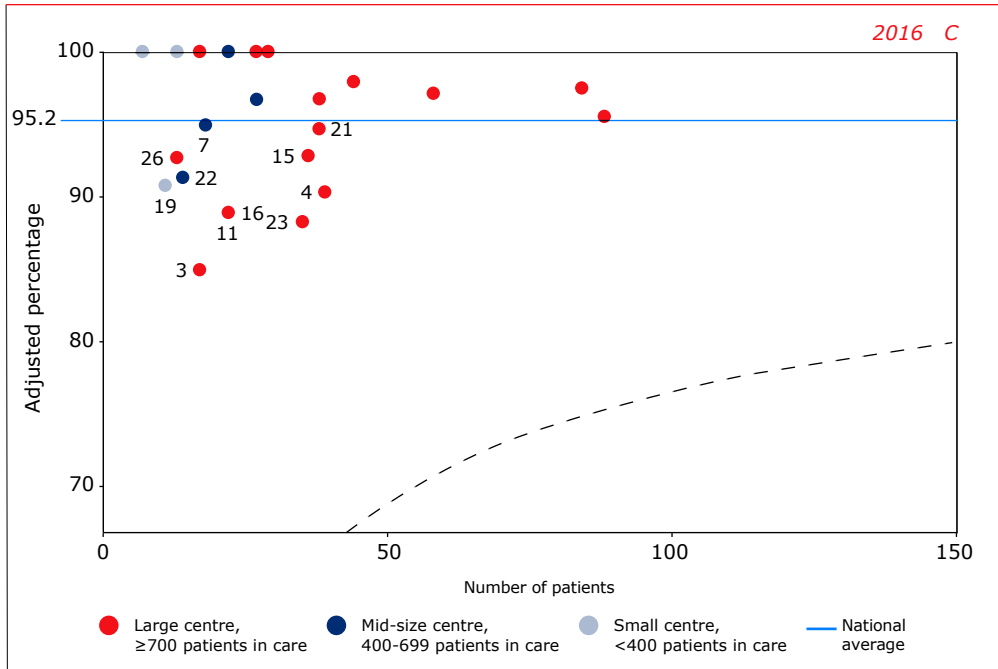
2017 B
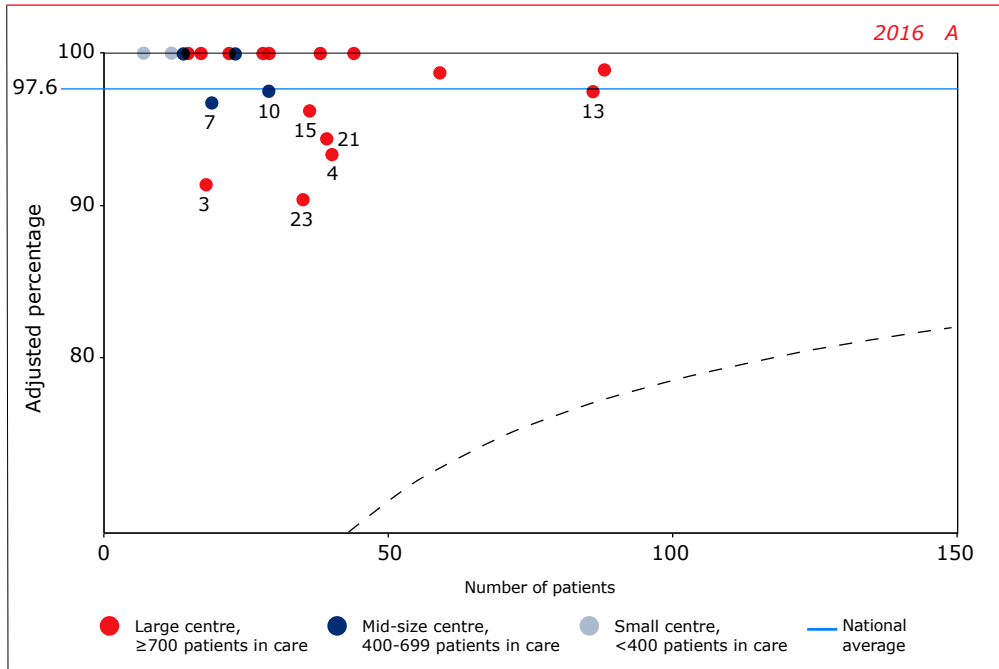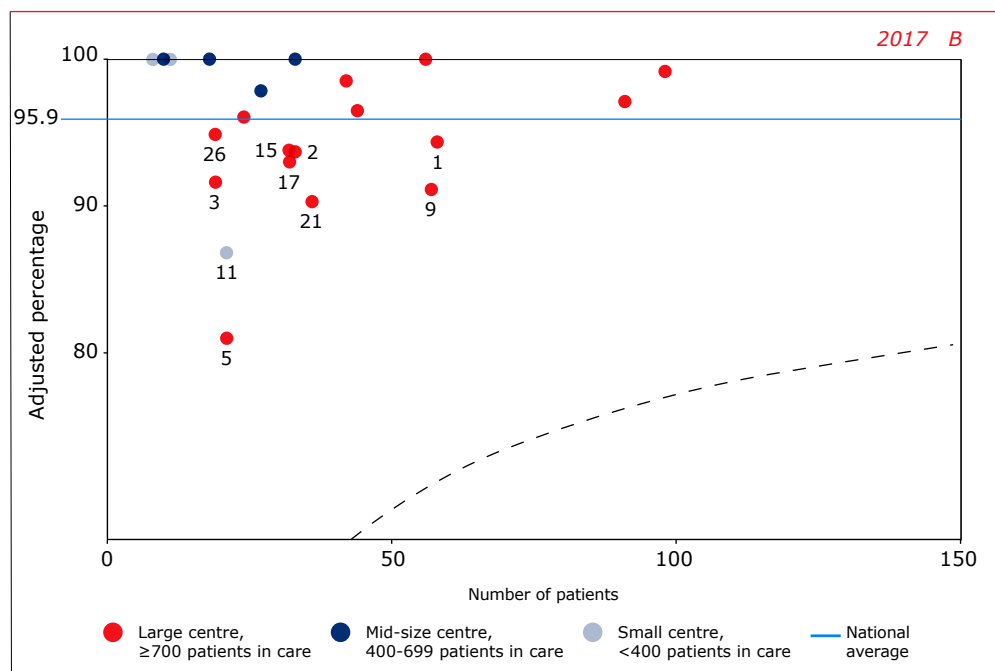
Legend: *Data points with centre numbers below the national average are labelled and correspond to Figure 7.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 7.2); no centre falls below this line.*

Figure 7.4: *Long-term retention in care, in other words, the status in 2019 for those who entered care between (A–D) 2014–17. The percentage of individuals retained in care has been adjusted for patient mix and is plotted as a function of the number of patients entered into care.*
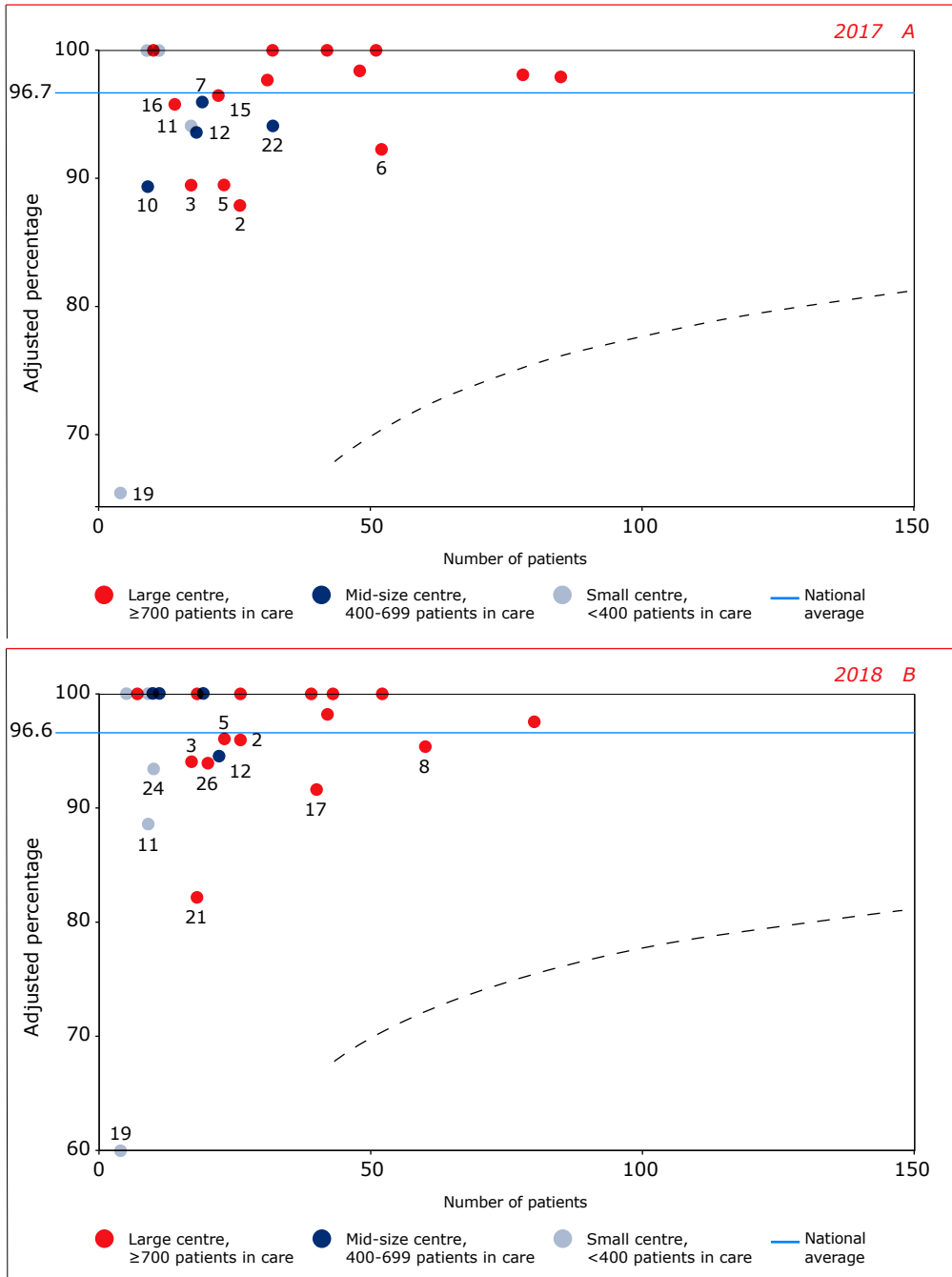
2016   C

2017   D
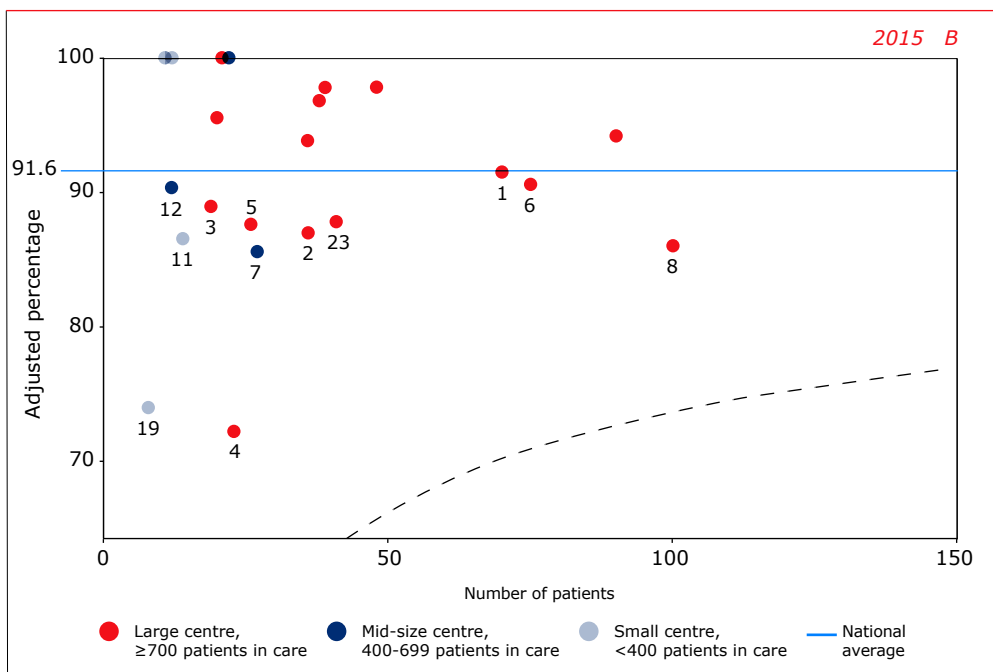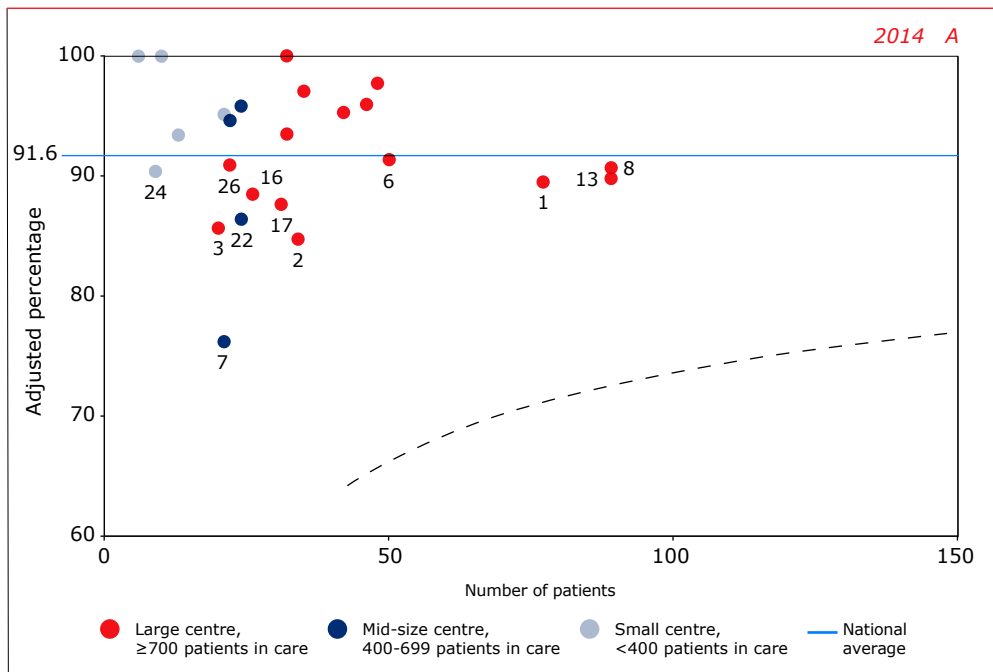
Legend: Data points with centre numbers below the national average are labelled and correspond to Figure 7.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 7.2); no centre falls below this line.

Initiation of cART

Across centres, the median adjusted percentage of patients who started cART within six months of entering care, was 96% for those entering care in 2017, and 98% for those entering care in 2018. In terms of variation across HIV treatment centres, this percentage ranged between 65–100% in 2017, and 60–100% in 2018. *Figure 7.5* shows the adjusted percentages of patients starting cART within six months of entering care per centre, according to the year in which they entered care. This figure demonstrates that all centres with at least 40 patients entering care in 2017 (*Figure 7.5A*) and in 2018 (*Figure 7.5B*), had adjusted percentages of patients starting cART within the expected range, when compared to the national average.

Among those who remained in care in 2019, the vast majority had initiated cART (across-centre median = 99%). This percentage was greater than 95% in all centres. *Figure 7.6* shows the adjusted percentages of patients in care in 2019 who had started cART, per centre. All percentages were within the expected range, when compared to the national average.

Figure 7.5: *The overall percentage of patients who entered care in A) 2017 and B) 2018, and started combination antiretroviral therapy (cART) within six months of entry. The percentage of individuals starting cART has been adjusted for patient mix and is plotted as a function of the number of patients entered into care.*

Legend: *Data points with centre numbers below the national average are labelled and correspond to 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 7.2); no centre falls below this line.*

Figure 7.6: The percentage of patients who entered care and who ever initiated cART and were still in care in 2019. The percentage of individuals starting cART has been adjusted for patient mix and is plotted as a function of the number of patients still in care in 2019.
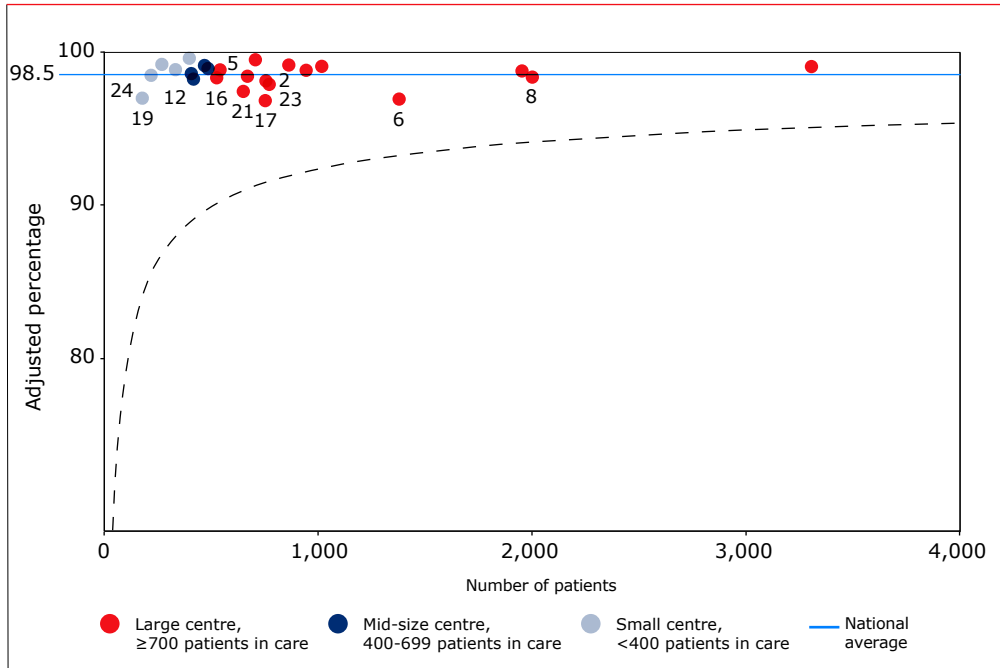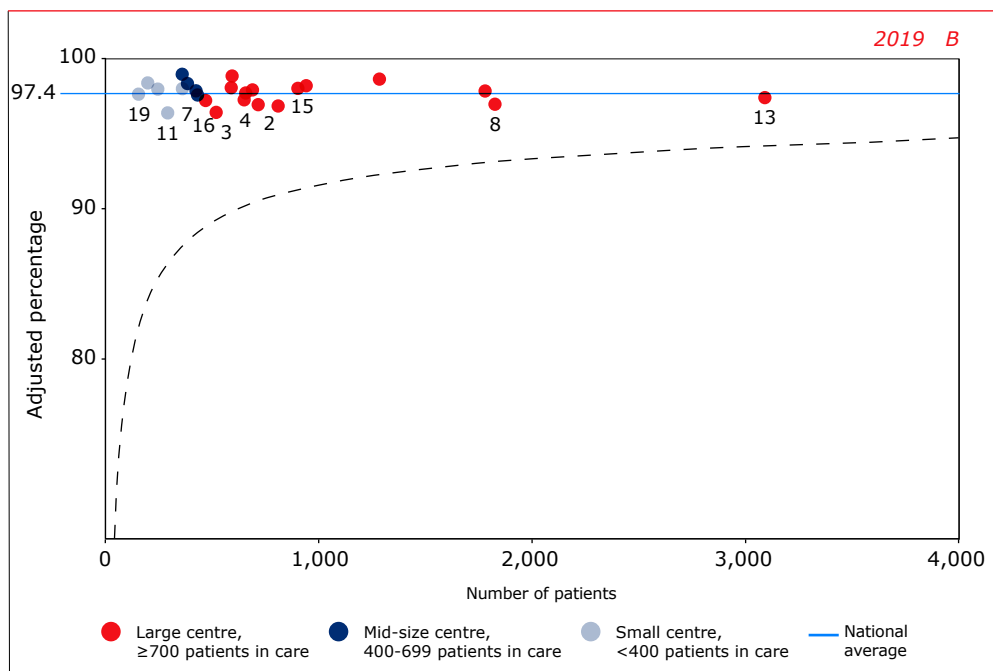

Legend: Data points with centre numbers below the national average are labelled and correspond to Figure 7.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 7.2); no centre falls below this line.

Viral suppression

Viral suppression was assessed with *three* indicators. The *first* indicator is the percentage of treatment-naive patients with an HIV RNA level <400 copies/ml six months (± three months) after the start of cART of patients newly initiating treatment in 2018, with follow up in 2019. The unadjusted percentage was 100% for all treatment centres. Since there was no across-centre variation in the percentage of patients who achieved viral suppression, we did not perform a funnel plot for this indicator.

The *second* viral suppression indicator is the percentage of all HIV-positive patients in care who have been on cART for at least six months and have a last available HIV RNA level <100 copies/ml. This indicator was calculated for the calendar years 2018 and 2019. In both calendar years, the median adjusted percentage was more than 90% (the minimum target of this indicator) across centres. *Figure 7.7* shows the adjusted percentage of this viral suppression indicator per treatment centre, illustrating the limited variation across centres of different patient volume in 2018 (*Figure 7.7A*) and in 2019 (*Figure 7.7B*). All centres had adjusted percentages within the expected range, when compared to the national level.

Figure 7.7: *The percentage of all HIV−positive patients in care in A) 2018 and B) 2019, respectively, who had been on combination antiretroviral therapy (cART) for at least six months and 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 2018 and 2019 who had been on cART for at least six months.*

2019   B

Legend: *Data points with centre numbers below the national average are labelled and correspond to 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 7.2); no centre falls below this line.*

The *third* viral suppression indicator is the percentage of all HIV-positive patients in care who have a last available HIV RNA level <100 copies/ml. This indicator was calculated for the calendar years 2018 and 2019, for all individuals with an HIV RNA measurement (the percentage without HIV RNA measurements was 1.6% in 2018 and 1.9% in 2019). Across centres, the median adjusted percentage was 96% (range = 93–98%) in 2018 and 96% (range = 94–98%) in 2019. *Figure 7.8* shows the adjusted percentage of this viral suppression indicator per treatment centre in 2018 (*Figure 7.8A*) and in 2019 (*Figure 7.8B*). All centres had adjusted percentages within the expected range, when compared to the national level.

Figure 7.8: The percentage of all HIV-positive patients in care in A) 2018 and B) 2019, respectively, 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 2018 and 2019.
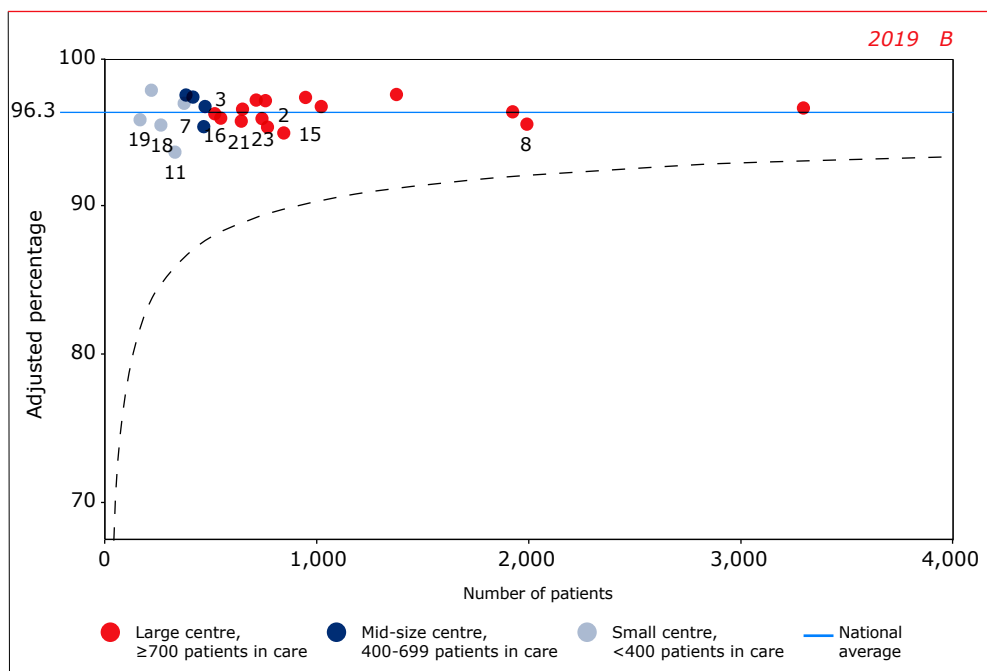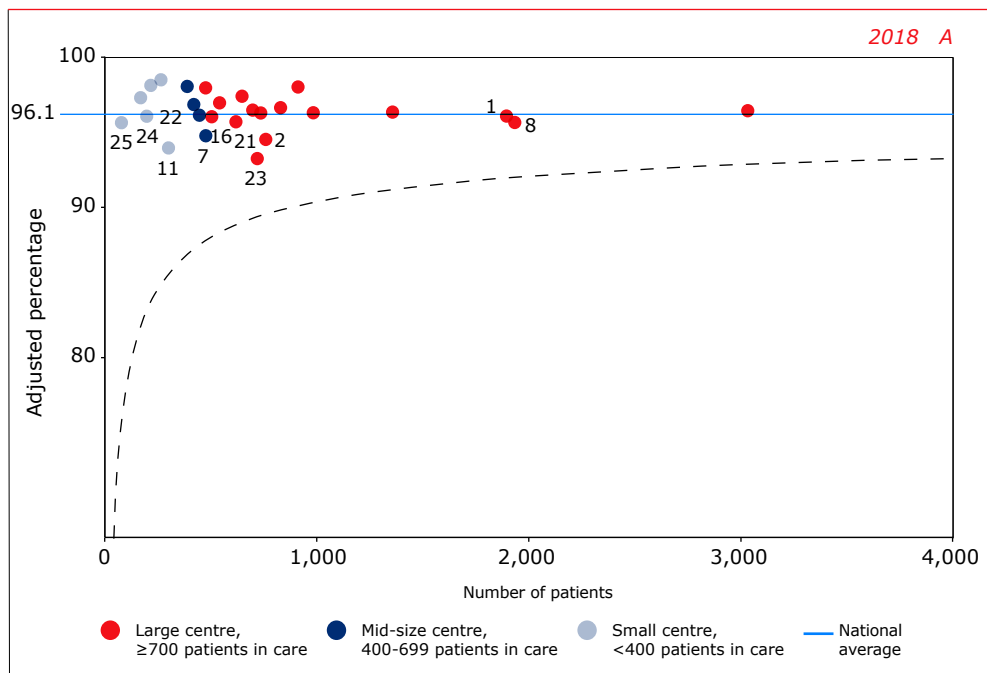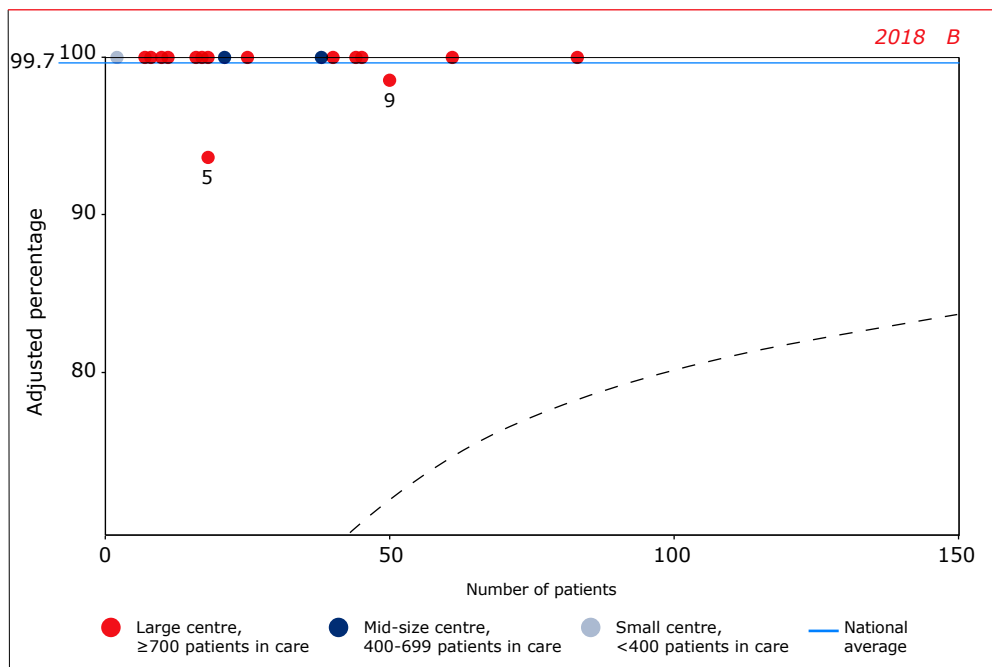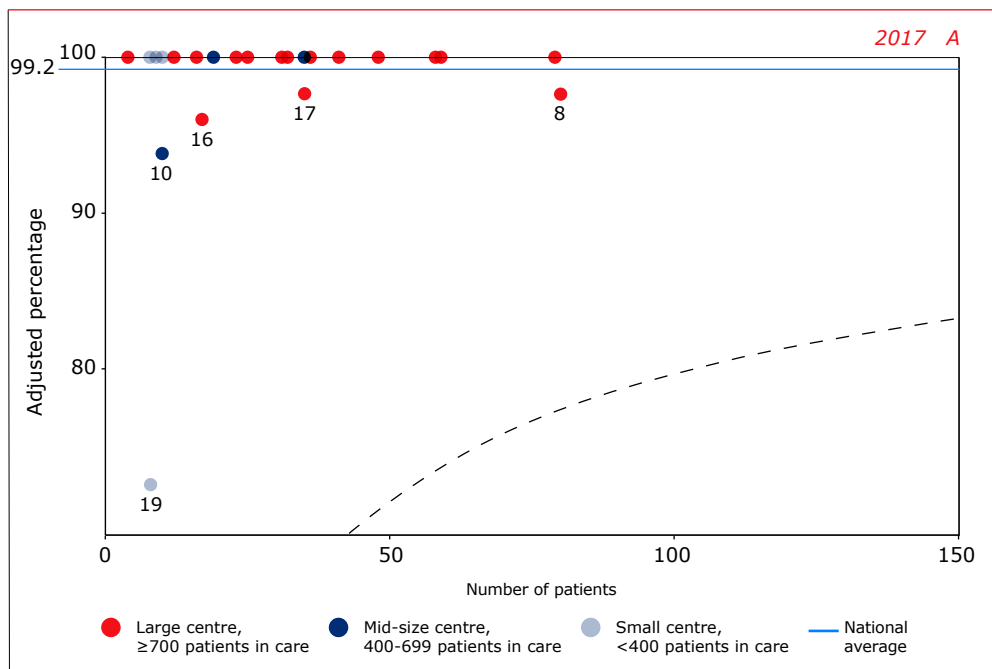
Legend: Data points with centre numbers below the national average are labelled and correspond to Figure 7.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 7.2); no centre falls below this line.
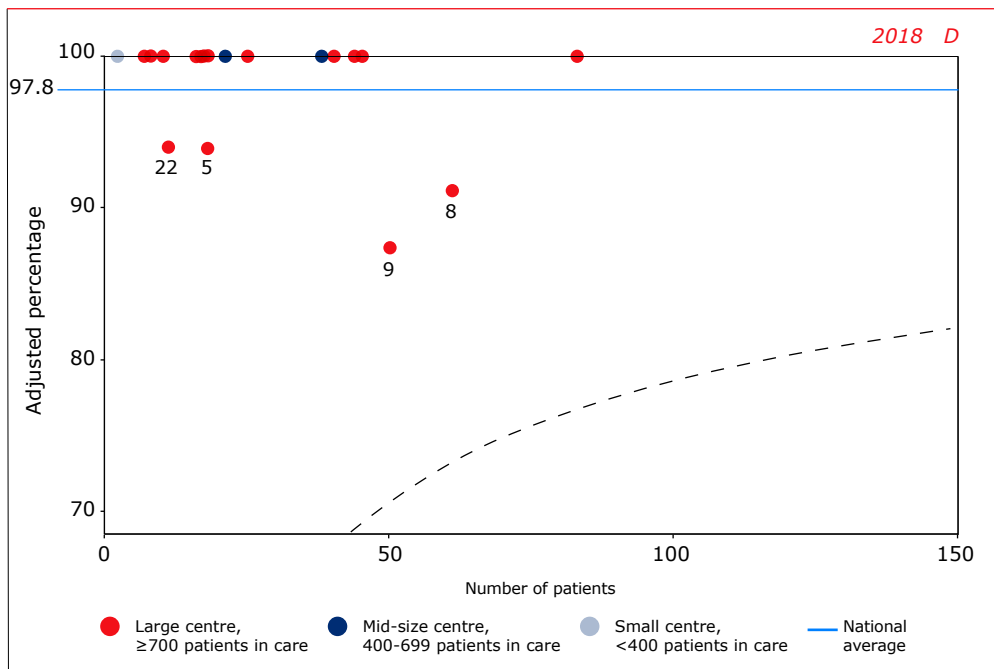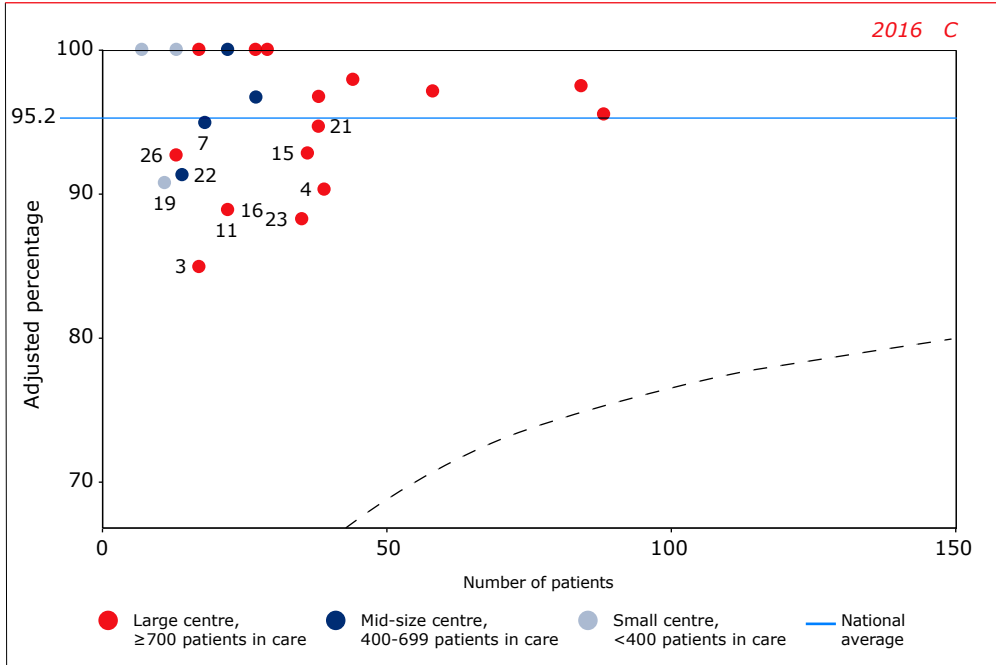
Process indicators

Prior to starting cART

Process indicators were evaluated in patients who newly entered care in 2017 and 2018. Across centres, the median adjusted percentage of individuals tested for plasma HIV RNA and CD4 cell count within six months of entering care were respectively 100% (range = 73–100%) and 100% (range = 87–100%) in 2017, and 100% (range = 94–100%) and 100% (range = 87–100%) in 2018. *Figure 7.9* shows the across-centre variation in adjusted percentages of individuals who had plasma HIV RNA (*Figures 7.9A and 7.9B*), and CD4 cell count measurements (*Figures 7.9C and 7.9D*). This figure demonstrates that all centres with at least 40 patients entering care in 2017 and 2018 had adjusted percentages within the expected range, when compared to the national level.

Figure 7.9: *The percentage of patients who newly entered care in Dutch HIV treatment centres in 2017 and 2018, respectively, with assessment within six months of (A, B) plasma HIV RNA and (C, D) CD4 cell count. The percentage of individuals with plasma HIV RNA and CD4 cell count measurements has been adjusted for patient mix and is plotted as a function of the number of patients entered into care.*

2016   C

Legend (chart): Large centre, ≥700 patients in care; Mid-size centre, 400-699 patients in care; Small centre, <400 patients in care; National average

2018   D

Legend (chart): Large centre, ≥700 patients in care; Mid-size centre, 400-699 patients in care; Small centre, <400 patients in care; National average
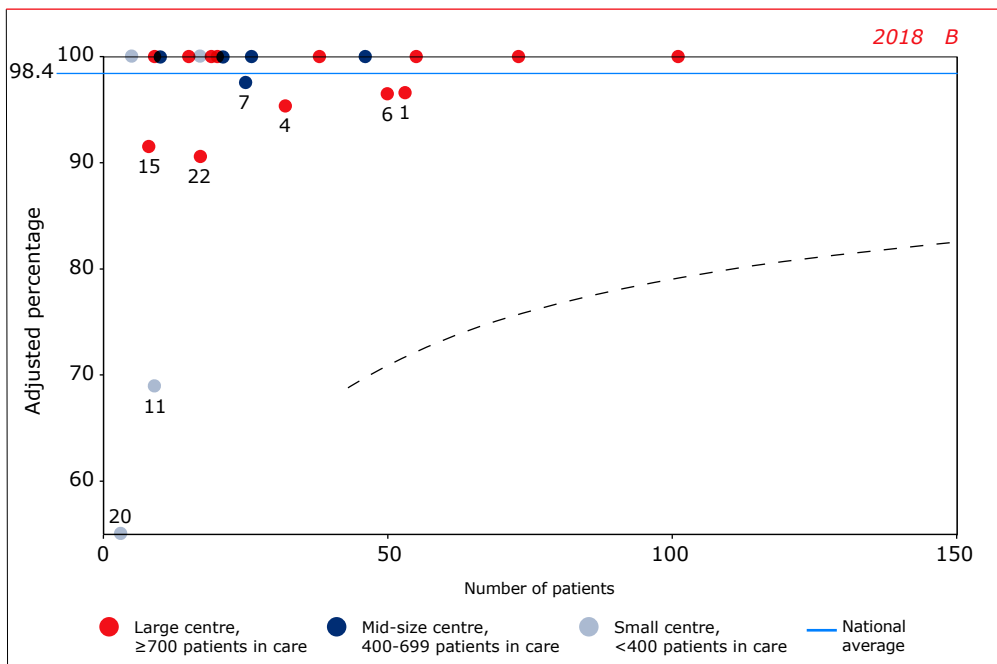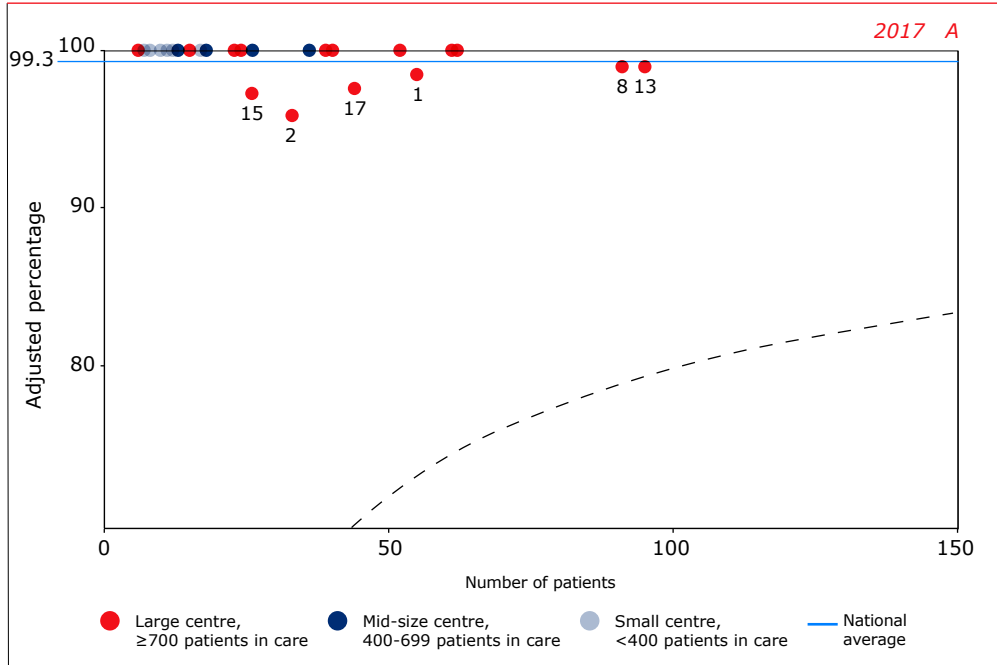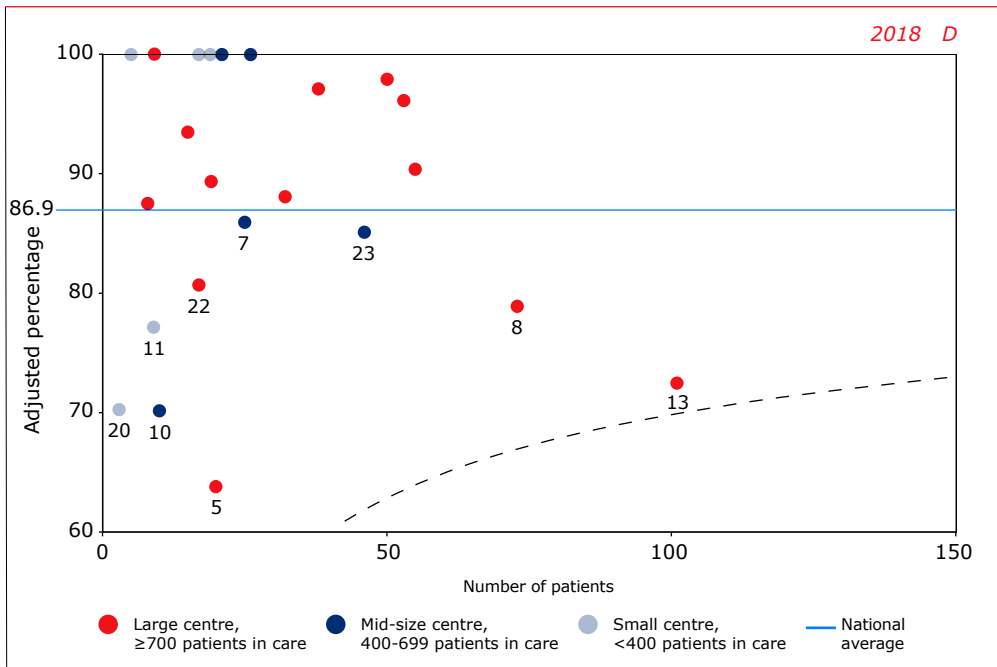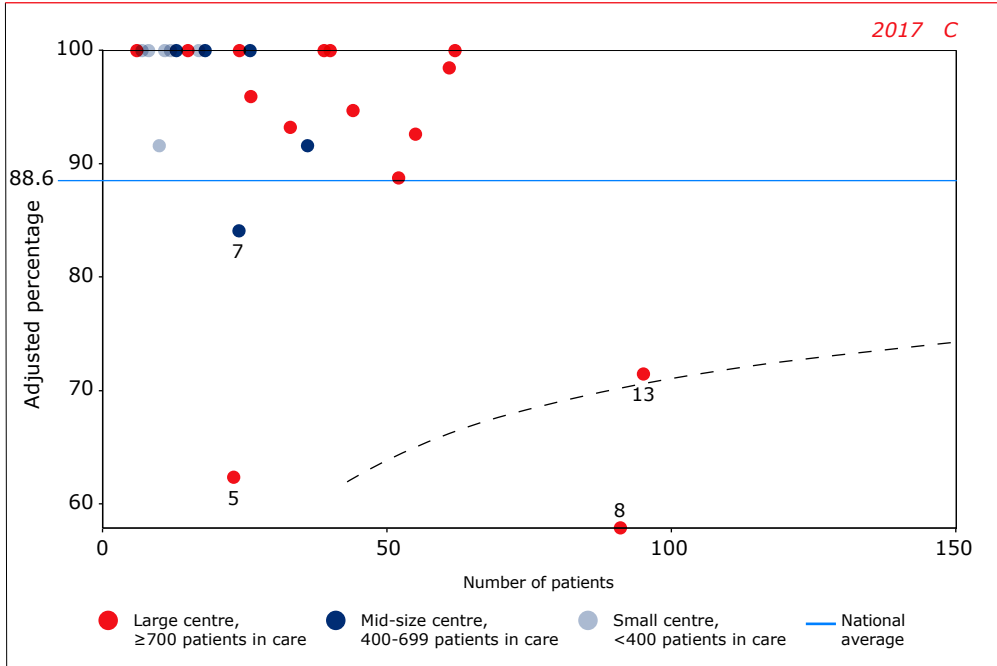
Legend: Data points with centre numbers below the national average are labelled and correspond to Figure 7.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 7.2); no centre falls below this line.

Following the start of cART

Process indicators were evaluated in patients who initiated cART in 2017 and 2018. Across centres, the median adjusted percentage of individuals tested for plasma HIV RNA and CD4 cell count within 13 months of initiating cART were respectively 98% (range = 83–100%) and 90% (64–100%) in 2017, and 95% (range = 52–100%) and 90% (64–100%) in 2018. *Figure 7.10* shows the across-centre variation in adjusted percentages who had plasma HIV RNA (*Figures 7.10A and 7.10B*), and CD4 cell count measurements (*Figures 7.10C and 7.10D*). This figure demonstrates that almost all centres with at least 40 patients entering care in 2017 and 2018 had adjusted percentages within the expected range when compared to the national level. One large-volume centre had a lower-than-expected percentage of individuals measured for CD4 cell count within 13 months of initiating cART in 2017. However, some of the variation in this indicator could be due to differences in the CD4 measurement protocols between centres.

Figure 7.10: The percentage of patients in HIV treatment centres in the Netherlands who initiated combination antiretroviral therapy (cART) in 2017 and 2018, respectively, with assessment of (A, B) plasma HIV RNA and (C, D) CD4 cell count within 13 months of cART initiation. The percentage of individuals with plasma HIV RNA and CD4 cell count measurements has been adjusted for patient mix and is plotted as a function of the number of patients who initiated cART in 2017 and 2018.

2017 C

2018 D

Legend: Data points with centre numbers below the national average are labelled and correspond to 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 7.2); only one large-volume centre falls below this line.

Indicators for patients who were in care in the two centres that closed in 2018

In 2018, two officially-acknowledged HIV treatment centres closed (MC Slotervaart, Amsterdam and MC Zuiderzee, Lelystad). During 2018, 778 patients were still in care in these two centres. Of these patients, 536 (69%) transferred to the care of another HIV treatment centre in the Netherlands (of whom 485 had a clinical visit in 2019); 59 (8%) moved abroad; 57 (7%) were lost to care; and 15 (2%) died. For 111 (14%) patients, care status was unknown at the time of this analysis (i.e., their current status was not relayed to the database). The percentage who moved abroad, were lost to care, or died are similar to those of the entire adult HIV-1 positive population in SHM in 2019 (Chapter 1). The high percentage with unknown care status is likely due to an administrative backlog; more information on these 111 patients is expected to become available in 2020.

The indicators most relevant to the group of patients who transferred care to another HIV treatment centre are as follows: the percentage of all HIV-positive people who had initiated cART and were still in care in 2019; the percentage of people on cART for at least six months in 2019 with a plasma HIV RNA level <100 copies/ml; and the percentage of all HIV-positive people in care in 2019 with a plasma HIV RNA level <100 copies/ml. *Table 7.1* summarises these indicators for individuals who were in care at a closed centre before transferring to another centre, and compares them to the median adjusted indicators across centres. This table shows that all indicators for the individuals who were transferred to a different centre were within the range of adjusted indicators across centres.

Table 7.1: Indicators in individuals who were in care at a closed centre before transferring to another HIV treatment centre.

Indicator (Box 7.1)	Individuals transferred from a closed centre (n=485)	Median adjusted* indicators (range) across all centres in the Netherlands
Initiated cART and still in care in 2019	99%	99% (97–100%)
On cART for at least six months in 2019 with a plasma HIV RNA level <100 copies/mL	98%	98% (95–100%)
In care in 2019 with a plasma HIV RNA level <100 copies/mL	97%	98% (93–100%)

Adjusted for patient mix.

Comparison between treatment centres and benchmarking

SHM has provided HIV treatment centres with the outcomes of centre-specific, ZiZo and HKZ-approved indicators since 2011. However, in 2017 and 2019, SHM also provided each centre with a number of the indicators described in this chapter, in a manner that allowed the centres to compare their indicators with the blinded scores of other centres. Subsequently, several centres approached SHM for more specific data regarding their scores.

In the context of quality of HIV care in the Netherlands, the data presented in this chapter may serve as a useful benchmark that centres can use to identify potential aspects for improvement. It is likely too early to observe an effect of this benchmarking, as most of the recent indicator scores are only reported through 2018; although performance in terms of the HKZ indicator "short-term viral suppression" is generally very high.

This year, each treatment centre will again be provided with their unadjusted, centre-specific indicators, benchmarked against the blinded scores of all other centres. These scores will be available through online centre-specific reports: https://shm.amc.nl.

Key findings and conclusions

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

- In 2019, eight HIV treatment centres of various patient sizes did not meet the criterion of seeing a minimum of 20 new patients per year, as required by the current HKZ standards for HIV treatment centres in the Netherlands. Five of these eight centres had already failed to meet this particular criterion in 2018. Further discussion about the appropriateness of this standard seems warranted.
- After exclusion of patients who either died or moved abroad, both short-term and long-term retention-in-care rates are generally high. This is also the case when adjusting for patient mix.
- The percentage of patients initiating cART within six months of entering care, remained high for those who entered care in 2017 and 2018, maintaining a median of 100%. The overall coverage of cART in 2019, regardless of time since entering care, was high across all centres, despite variations in centre volume and patient mix.
- Viral suppression rates in the first six months on cART, and during longer-term use of cART, were 100% across all HIV treatment centres in the Netherlands in 2019.

- Across centres, the median adjusted percentage of all patients in care with an HIV RNA level <100 copies/ml was 96% in 2018 and 98% in 2019. There was little variation in this percentage across centres after adjusting for patient mix.
- With only one exception, for every indicator, all centres were within the statistically-expected range, based on the national average and accounting for centre volume and patient mix.
- The cART and viral suppression indicators for individuals who were originally in care in one of the two centres that closed, do not appear to have been affected by the transfer of care to another HIV treatment centre. However, more information is needed on individuals whose current care status is unknown.
- The funnel plots provide a statistical interpretation of whether a centre performs within the expected range of the national average. Unfortunately, this interpretation becomes less reliable when a centre is treating only a limited number of patients (i.e., fewer than 40, for the purpose of this report). As many centres had fewer than 40 patients newly entering care in 2016-19, they could not be feasibly compared to the national average. We therefore urge caution when comparing indicators of these small centres to the national average, or even to fixed levels (e.g., 90%). Understanding the reasons for not achieving higher percentages would require more in-depth analysis at the centre level, which cannot be readily performed by the SHM.
- The wide range of indicators used in these analyses offers broad coverage of various aspects of HIV care, and provides insight into care provision among 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 will be met at the centre level. Nonetheless, data reliability remains an important issue, and it should be recognised that some of the reported variation 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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