

Human Immunodeficiency Virus (HIV)
Infection in the Netherlands



HIV Monitoring Report

2025

Chapter 10: Quality of care



10. Quality of care

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Introduction

One of the missions of SHM is to contribute to the quality of HIV care in the Netherlands. Via the collection of pseudonymised data from individuals in outpatient care at the 23 dedicated treatment centres, SHM can provide a nationwide overview of the outcome of care for individuals. This unique overview allows SHM to facilitate assessment of the quality of HIV care in the Netherlands.

The Dutch Association of HIV-Treating Physicians (*Nederlandse Vereniging van HIV Behandelaren*, NVHB) has issued a variety of indicators to reflect the quality of health care provided to individuals with HIV. These include, for example, HIV outcome indicators (e.g., the percentage with HIV viral suppression), and hepatitis B and C virus and syphilis screening for all individuals in care and for men who have sex with men (MSM) separately. Given the broad range of indicators, SHM, along with members of the Quality Commission from the NVHB, has decided to focus on only one set of key indicators that will be described in this year's report.

As individuals with HIV have increased their lifespans with the use of effective antiretroviral therapy, age-related comorbidities have increased in prevalence¹. One of the more concerning comorbidities is cardiovascular disease². As in last year's report, we focus our indicators on primary and secondary prevention of cardiovascular disease. We evaluate center-specific completeness of information for the following indicators: smoking, lipid profile, and blood pressure measurement.

The SCORE-2 for individuals aged 40-69 years old and the SCORE2-OP for individuals 70 years old or older are often used in clinical care to understand the 10-year risk of developing a cardiovascular disease event for those who have not yet had such an event^{3,4}. We provide information on whether the SCORE2 or SCORE2-OP were able to be calculated for these age groups. For individuals with a 10-year risk of a cardiovascular disease event of 10% or higher (based on former Dutch recommendations), we report the percentage who received a prescription for statins and those with an LDL cholesterol at or below the recommended limits in (i.e., target LDL cholesterol)⁵. The results of the REPRIEVE study⁶ have led to an updated recommendation in the EACS and Dutch guidelines of the prescription for statins when a 10-year risk of cardiovascular disease event was $\geq 2.5\%$ for those



aged <50 years, $\geq 5\%$ when aged between 50 and 69 years and $\geq 7.5\%$ when aged above 70 years^{7,8}. Reporting in accordance with the revised recommendations has not been assessed for the calendar years 2020–2023, as the revised recommendations were not yet implemented in clinical practice during these years. For the year 2024, we report an additional analysis on the percentage of individuals who received prescription for statins in which outcomes under the former and revised guidelines are compared.

Finally, we report the percentage of individuals who had high blood pressure and received a prescription for antihypertensive medication and, conversely, the percentage of individuals who received an antihypertensive medication and had a blood pressure at or below the recommended limits in Dutch guidelines (i.e., target blood pressure)⁵. The full list of indicators, their definitions and in which populations these indicators were analyzed are provided in Box 10.1.

This analysis relates to all individuals who were diagnosed with HIV and who are currently in care at one of the 23 HIV treatment centres in the Netherlands. To facilitate presentation, we have decided to provide mostly figures describing changes over the last 5 years and comparison of indicators between individual centres and the national average. Indicators are reported for the 23 HIV treatment centres individually. Each HIV treatment centre is referenced by a number, which is used consistently across all figures in this chapter. These centre numbers do not correspond with those used in the map with centre overview at page 5 of this report.

Box 10.1: Definitions of specific indicators and focus populations.

Specific indicator	Definition	Focus population
Information on smoking		
	The number of patients who ever gave information on their smoking status.	40 years old or older
Information needed for cardiovascular disease screening		
Total, HDL or LDL cholesterol	The percentage of individuals who had a total, HDL or LDL cholesterol measurement during the calendar year ¹ .	40 years old or older
Blood pressure	The percentage of individuals who had at least one blood pressure measurement during the calendar year.	
All cardiovascular parameters	The percentage of individuals who had total, HDL and LDL cholesterol and blood pressure measurement during the calendar year.	
Information on cardiovascular event risk		
SCORE2(-OP)	The percentage of individuals who had enough information to have their SCORE2(-OP) cardiovascular risk assessment during the calendar year.	40-69 year olds (SCORE2) or 70 year old or older (SCORE2-OP), without a history of CVD



Statin use		
	The percentage of individuals who received a prescription for statins during the calendar year.	40 years old or older with SCORE2 or SCORE2-OP predicted 10-year risk greater than 10%, without a history of CVD ² and differentiated by age: $\geq 2.5\%$ when aged <50; $\geq 5\%$ aged 50-69 years; $\geq 7.5\%$ when aged ≥ 70 years
Target LDL cholesterol		
	The percentage of individuals who had an LDL cholesterol level ≤ 2.6 mmol/mL during the calendar year.	40 years old or older with SCORE2 or SCORE2-OP predicted 10-year risk greater than 10%, without a history of CVD ²
Antihypertensive medication use		
	The percentage of individuals who received a prescription for antihypertensive medication during the calendar year.	<ul style="list-style-type: none">• All individuals with high blood pressure³• And stratified by hypertension grades⁴
Target blood pressure		
	The percentage of individuals who had a systolic blood pressure <130 mmHg and diastolic blood pressure <80 mmHg (for those 18-64 years old), or a systolic blood pressure <140 mmHg and diastolic blood pressure <80 mmHg (for those 65 years old or older)	All individuals on antihypertensive medication

Abbreviations: HDL = high-dense lipoprotein; LDL = low-density lipoprotein.

¹ Calendar year is defined as running from 1 January to 31 December.

² Details on these scores can be found in the following website: <https://u-prevent.com> and also references^{3,4,7,8}.

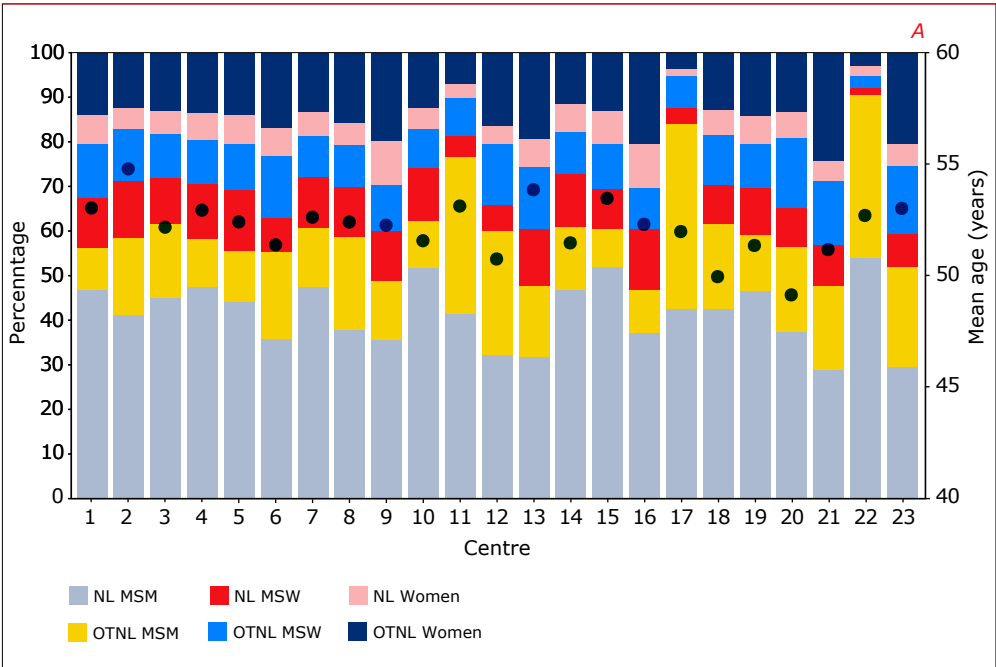
³ Defined as a diastolic blood pressure ≥ 90 mmHg.

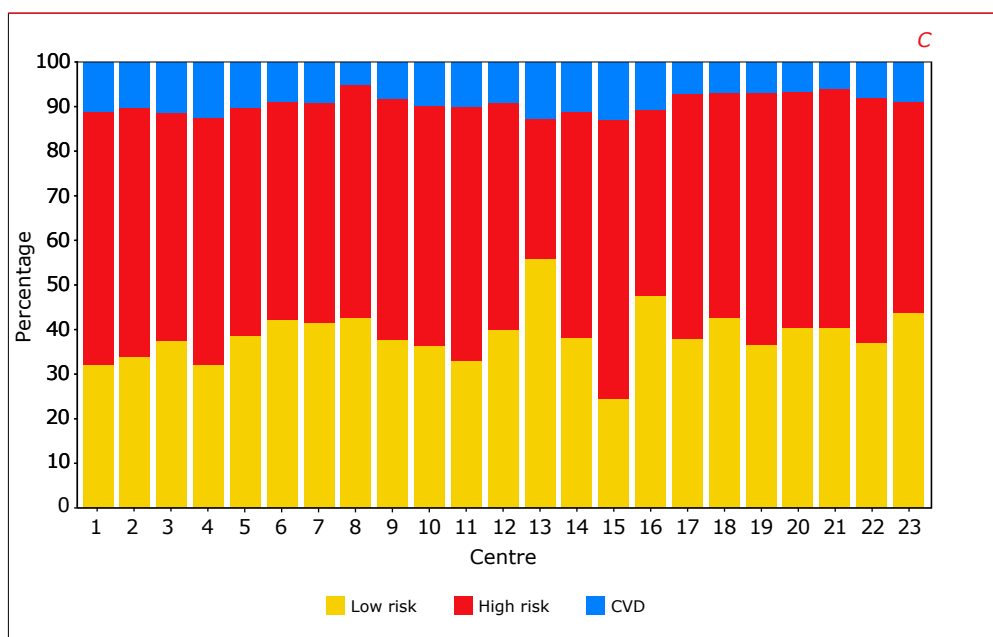
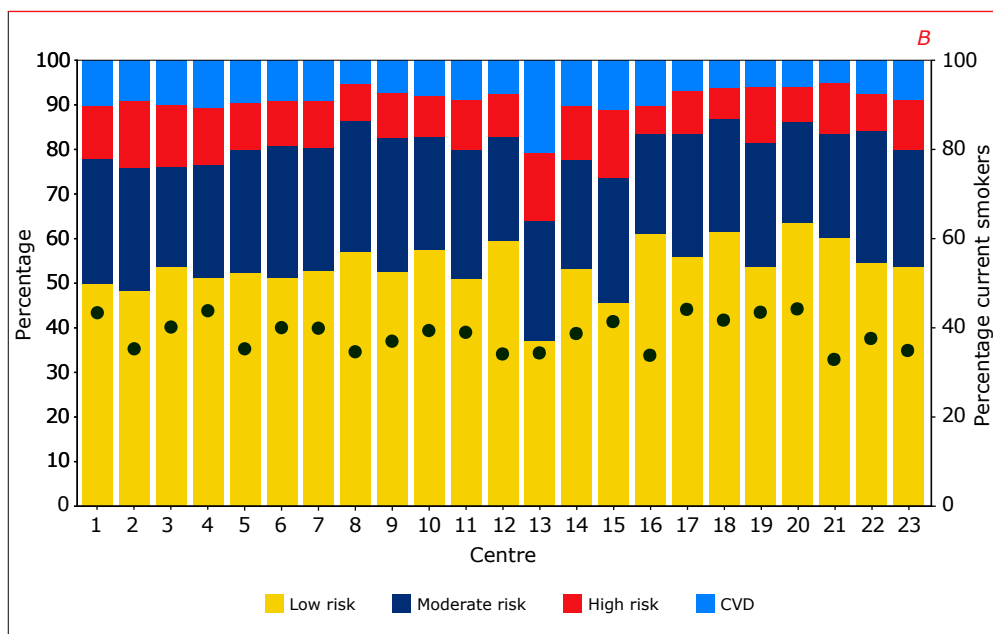
⁴ Defined as hypertension Grade 1 BP 140–159/90–99 mmHg; Grade 2 Hypertension BP 160–179/100–109 mmHg; Grade 3 Hypertension BP > 180/110 mmHg⁸.

Centre overview

To provide an understanding of the patient ‘mix’ across centres, the distribution of geographical origin/mode of HIV acquisition/gender groups and age have been provided for each centre (Figure 10.1A). The distribution of individuals with low (<5%), moderate (5-10%), and high (>10%) predicted 10-year risk of cardiovascular disease according to the former recommendations, for those who have not had a cardiovascular disease event, and the percent with cardiovascular disease are also provided for each treatment centre (Figure 10.1B). Figure 10.1C shows the distribution of individuals with low and high predicted 10-year risk of cardiovascular disease according to the new recommendations. Predicted 10-year cardiovascular risk was assessed with SCORE2 (i.e., 40-69 year olds) or SCORE2-OP (i.e., 70 year olds or older). These are presented alongside the percentage of individuals who are currently smoking.

Figure 10.1: Description of the patient ‘mix’ for individuals in care (A), distribution of cardiovascular disease risk according to the former recommendations and smoking status (B), and the distribution of cardiovascular risk according to the new recommendations in 2024 in the Netherlands (C).





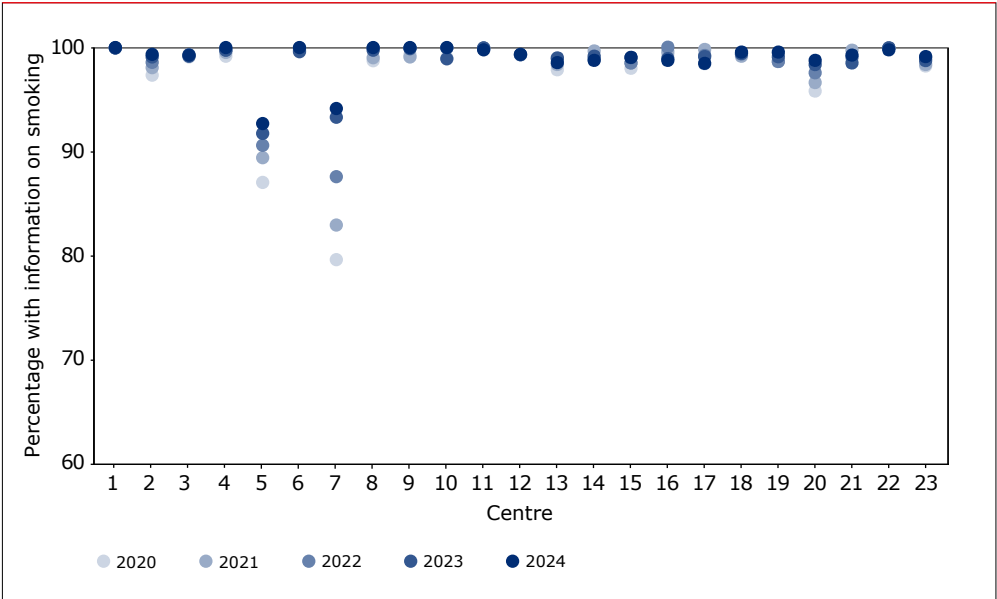
Note: In A, the bars in this chart show the percentage of individuals per centre according to geographical origin/mode of transmission/gender group. In A, black dots represent the mean age of individuals in care at each centre. In B, black dots represent the percent of current smokers of individuals in care at each centre. This panel distinguishes those who already have cardiovascular disease (CVD) and those who are low, moderate or high risk according to the predicted 10-year cardiovascular risk were assessed with SCORE2 (i.e., 40-69 year olds) or SCORE2-OP (i.e., 70 year olds or older).

Legend: CVD=cardiovascular disease; MSM = men who have sex with men; MSW = men who exclusively have sex with women; OTNL = other than Dutch.

Evolution of indicators over time

To provide an understanding of how indicators have evolved, each indicator in *Box 10.1* has been reported for its corresponding focus population on an annual basis between 2020 and 2024. For example, the indicator ‘information on smoking’ has been provided for individuals who were 40 years old or older and were in care in 2020, 2021, 2022, 2023, and 2024.

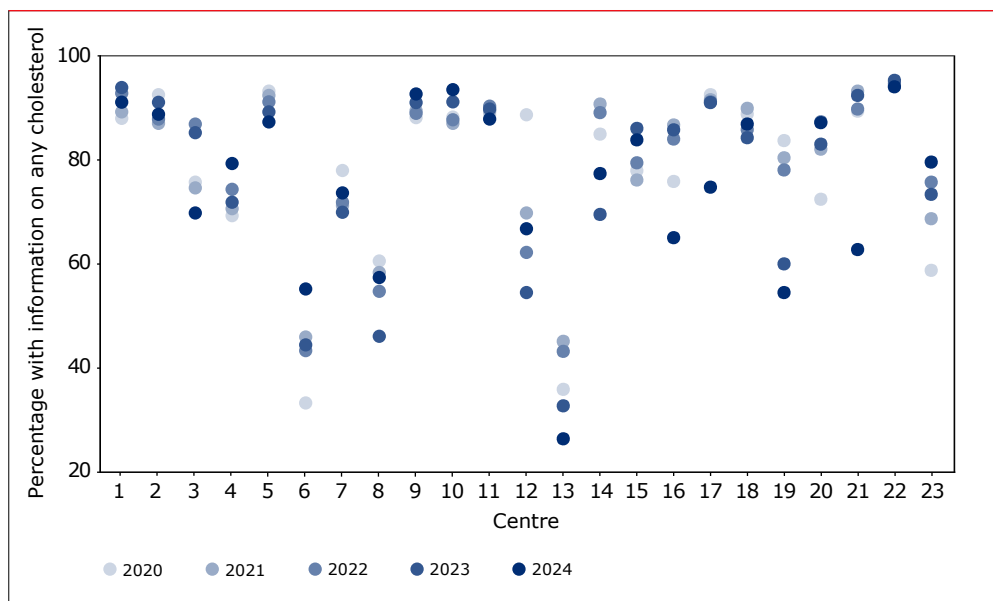
Figure 10.2: Information on smoking; in other words, individuals who ever had information on their smoking status during each year between 2020 and 2024.



Legend: Data are provided for individuals 40 years old or older. Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

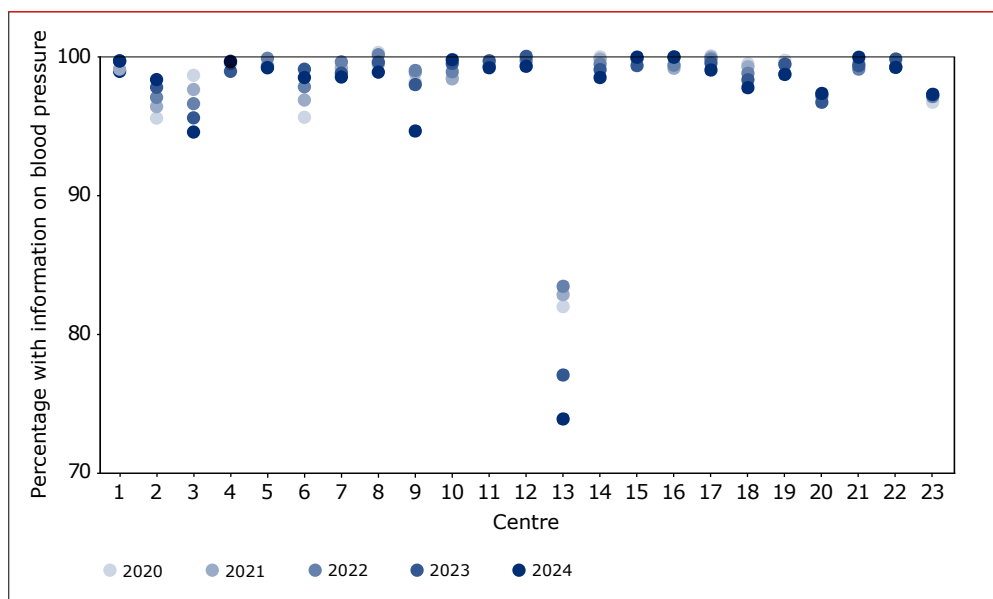


Figure 10.3: Information on total cholesterol; in other words, individuals who had a total, LDL or HDL cholesterol measurement during each year between 2020 and 2024.



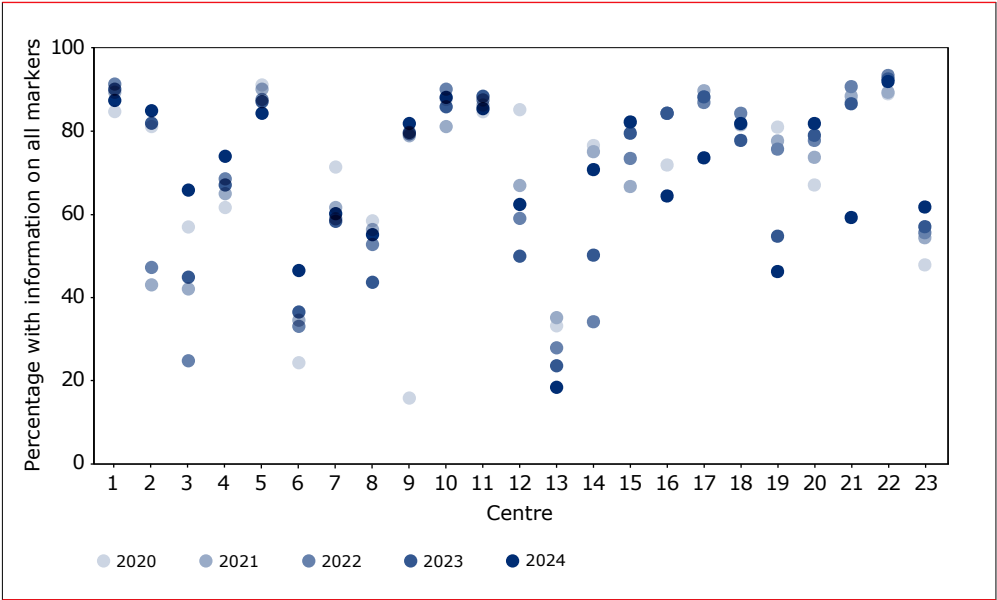
Legend: Data are provided for individuals 40 years old or older. Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

Figure 10.4: Information on blood pressure; in other words, individuals who had a blood pressure measurement during each year between 2020 and 2024.



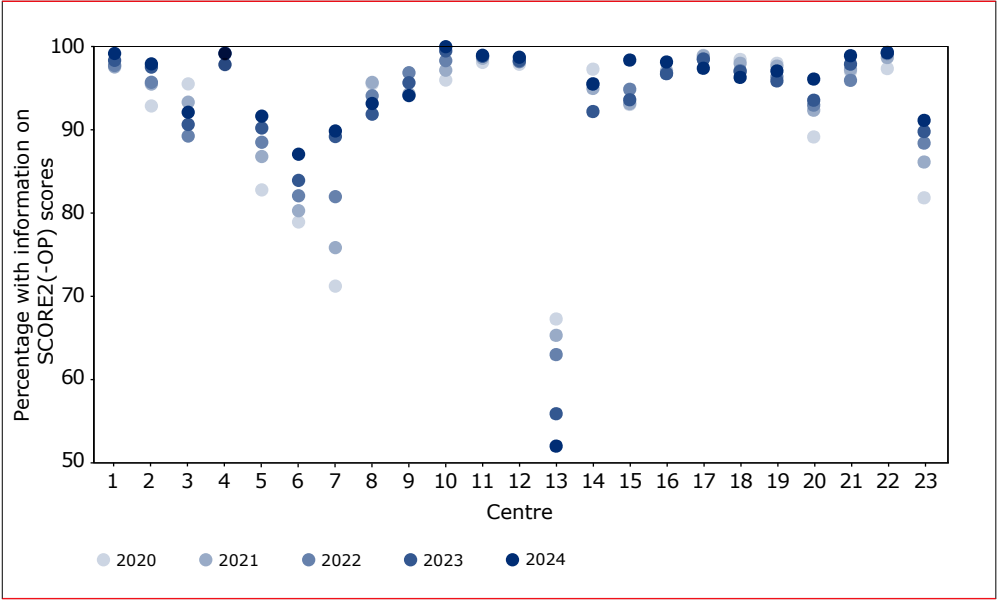
Legend: Data are provided for individuals 40 years old or older. Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

Figure 10.5: Information on all cardiovascular parameters; in other words, individuals who had total, HDL, LDL cholesterol and blood pressure measurement during each year between 2020 and 2024.



Legend: Data are provided for individuals 40 years old or older. Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

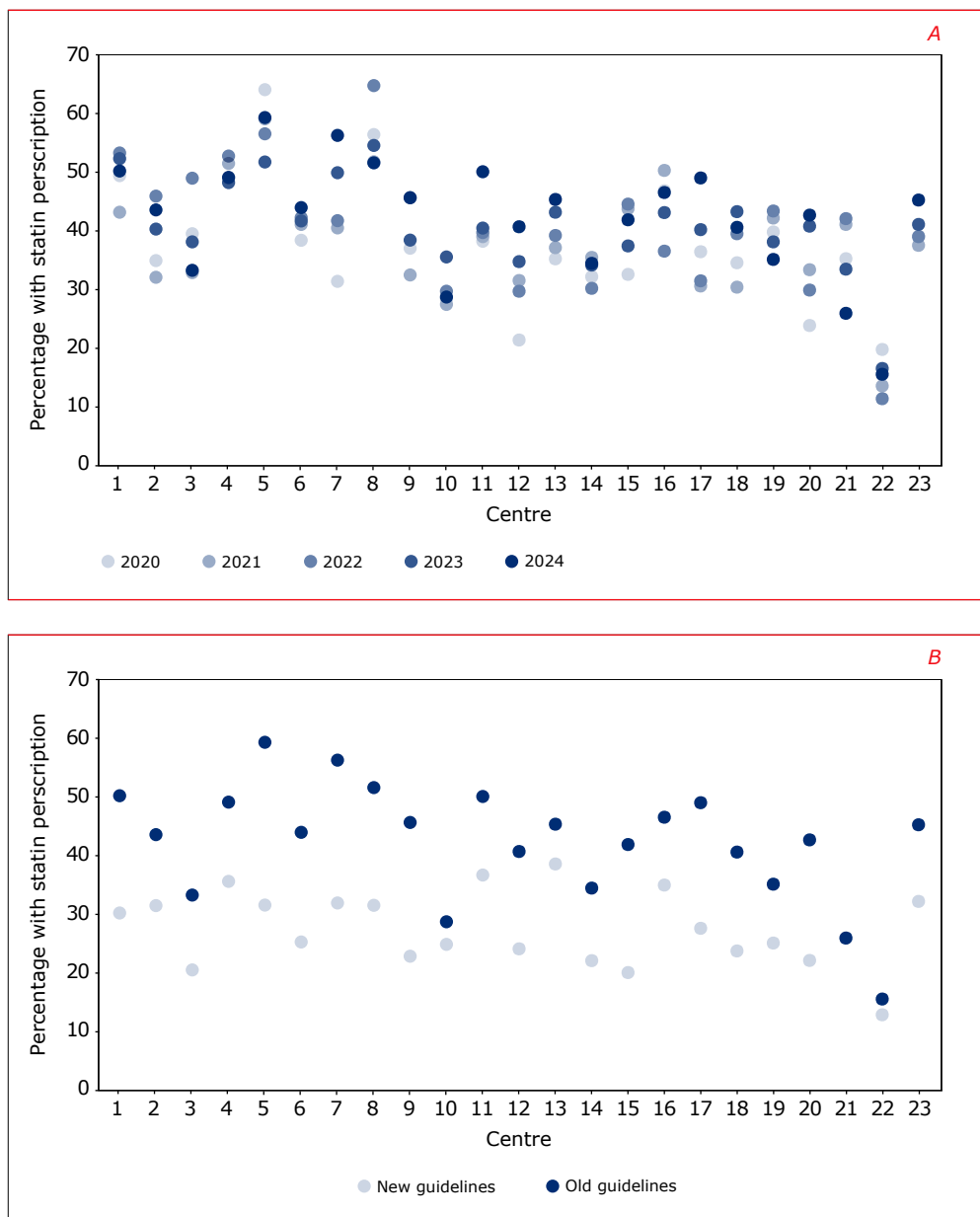
Figure 10.6: Information on cardiovascular event risk during each year between 2020 and 2024.



Legend: The indicator represents individuals who had enough information to have their cardiovascular disease assessed by the SCORE2 (40–69 year olds) or SCORE2-OP (70 year olds or older). Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

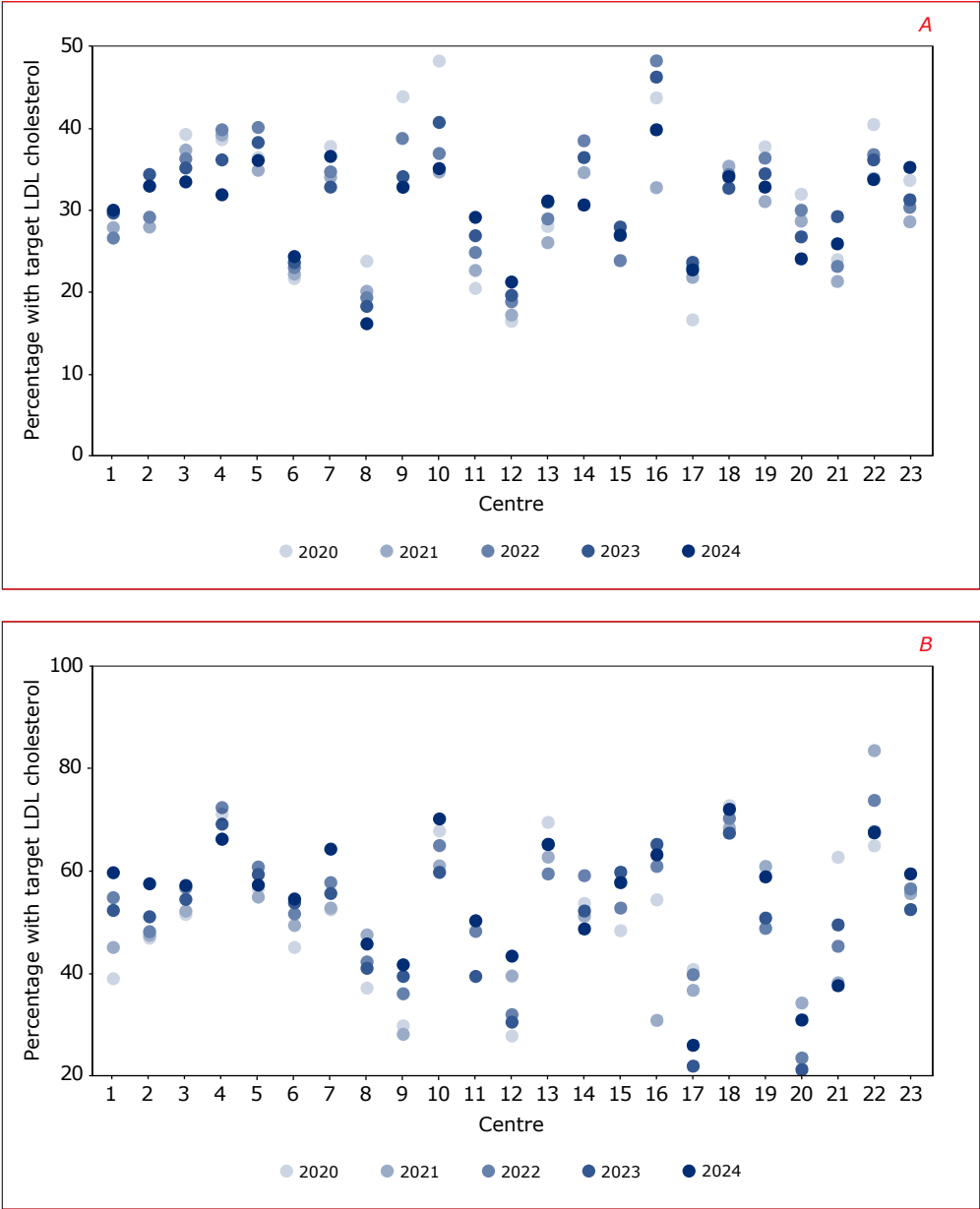


Figure 10.7: Statin use; in other words, individuals who had a predicted 10-year cardiovascular event risk-score (A) greater than 10%, using the SCORE2(-OP) and received a prescription for statins during each year between 2020 and 2024 and (B) high cardiovascular event risk-score defined according to the old and new recommendations for the year 2024.



Legend: Data are provided for those whose predicted 10-year cardiovascular risk were assessed with SCORE2 (i.e., 40–69 year olds) or SCORE2-OP (i.e., 70 year olds or older). Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

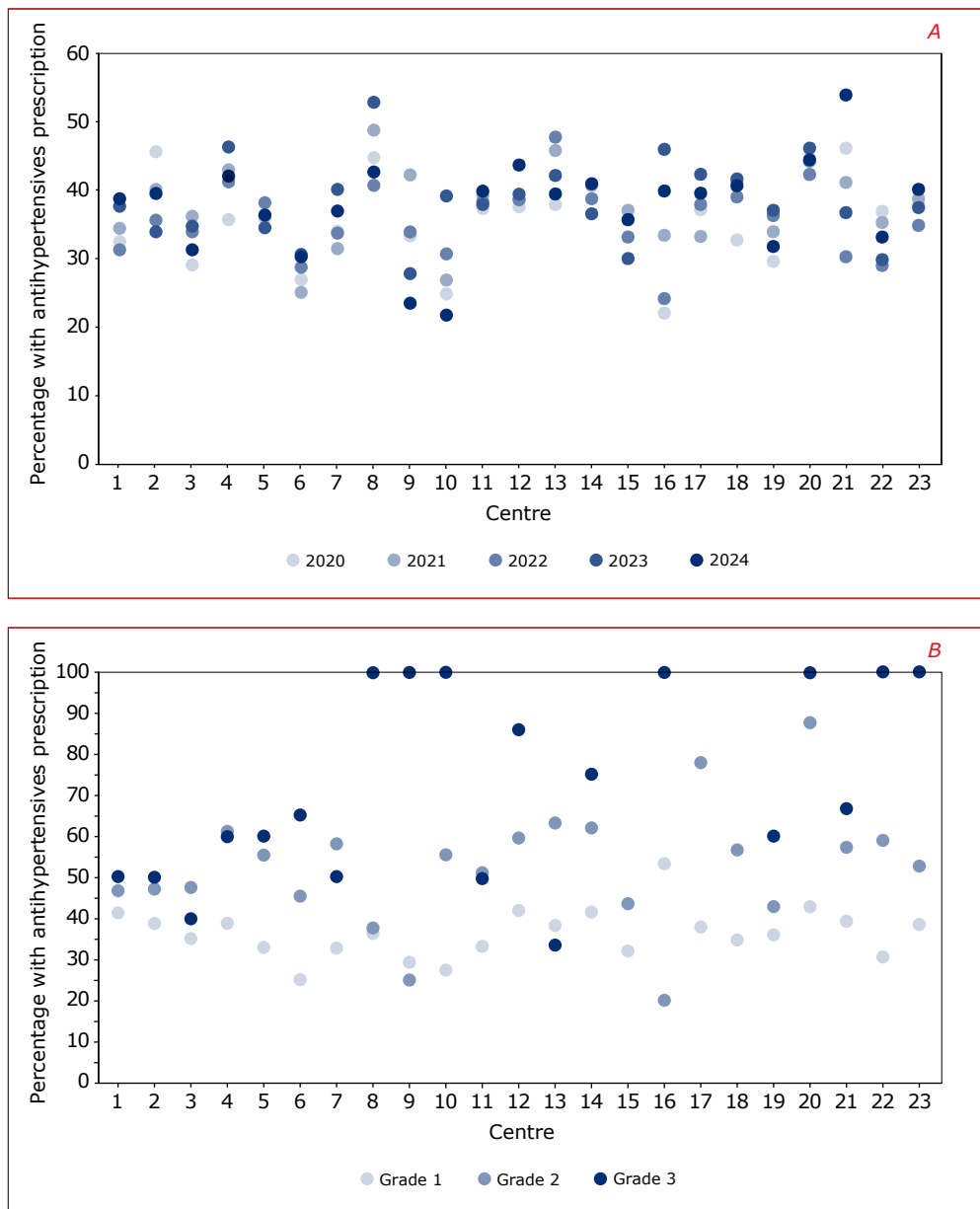
Figure 10.8: Target LDL cholesterol; in other words, individuals who had a predicted 10-year cardiovascular event risk-score greater than 10%, using the SCORE2(-OP), without (A) and with a prescription for statins (B), and had an LDL cholesterol level ≤ 2.6 mmol/mL during each year between 2020 and 2024.



Legend: Data are provided for those whose 10-year cardiovascular risk were assessed with SCORE2 (i.e., 40–69 year olds) or SCORE2-OP (i.e., 70 year olds or older). Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

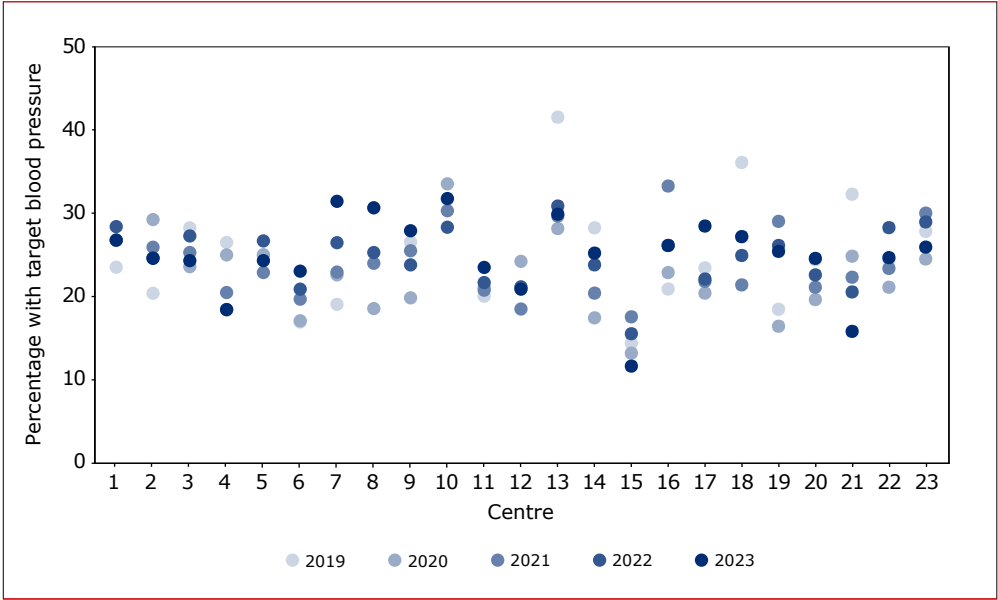


Figure 10.9: Antihypertensive medication use; in other words, individuals who had high blood pressure and received a prescription for antihypertensive medication during each year between 2020 and 2024. (A) high blood pressure defined as a diastolic blood pressure ≥ 90 mmHg and (B) by different grades of hypertension for the year 2024.



Legend: (A) Data are provided for those who had high blood pressure, defined as ever having a diastolic blood pressure ≥ 90 mmHg. (B) Data provided for those with hypertension, defined as grade 1 blood pressure 140–159/90–99 mmHg; grade 2 Hypertension blood pressure 160–179/100–109 mmHg; grade 3 Hypertension blood pressure $> 180/110$ mmHg Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.

Figure 10.10: Target blood pressure; in other words, individuals who were receiving antihypertensive medication and had a blood pressure below age-specific thresholds during each year between 2020 and 2024.



Legend: Age-specific thresholds refers to the following: systolic blood pressure <130 mmHg and diastolic blood pressure <80 mmHg (for those 18–64 years old), or a systolic blood pressure <140 mmHg and diastolic blood pressure <80 mmHg (for those 65 years old or older). Data are provided for those on antihypertensive medication. Data points from multiple years can overlap with one another. Centre numbers correspond to those used in Figure 10.1.



Centre performance

As reported in earlier studies, both the number of individuals 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 indicators⁹⁻¹¹.

Regarding centre volume, a smaller number of individuals at 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 above or below the national average. This assessment depends on the number of individuals included when calculating the indicator (an overview of this method is provided in *Box 10.2*). Statistical interpretation is unreliable when centre sizes are small, hence we do not draw conclusions on whether these centres fall below the national average.

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 individuals 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 10.2*). For this section, we have used all the indicators and populations defined in *Box 10.1*, while accounting for the issues described above. Only indicators from 2024 were considered in this analysis.

Box 10.2: Funnel plots to compare centres to the national average.

What types of problems occur when evaluating indicators?	
Centres treating fewer individuals	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 <i>statistically</i> 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 plot¹²?

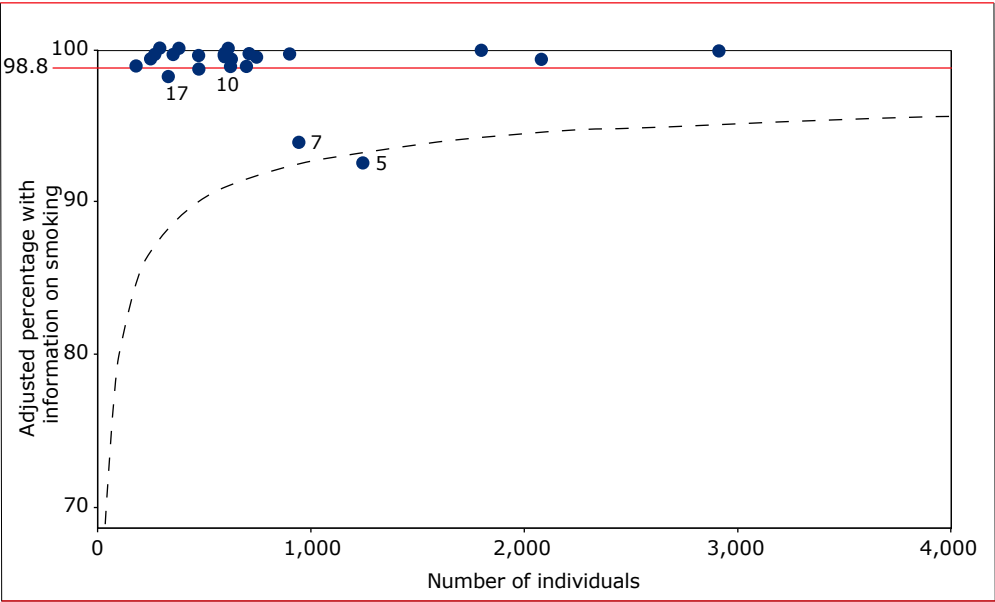
A funnel plot is a graphical depiction that allows us to compare a centre's indicator to the national average. It can help account for the problems listed above. The following are key components of this plot:

Patient size	The x-axis depicts the number of individuals considered in a given indicator. For example, this number could be the total number of individuals in care in 2024, etc.
Adjusted %	The y-axis depicts the percentage of individuals 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 individuals 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.

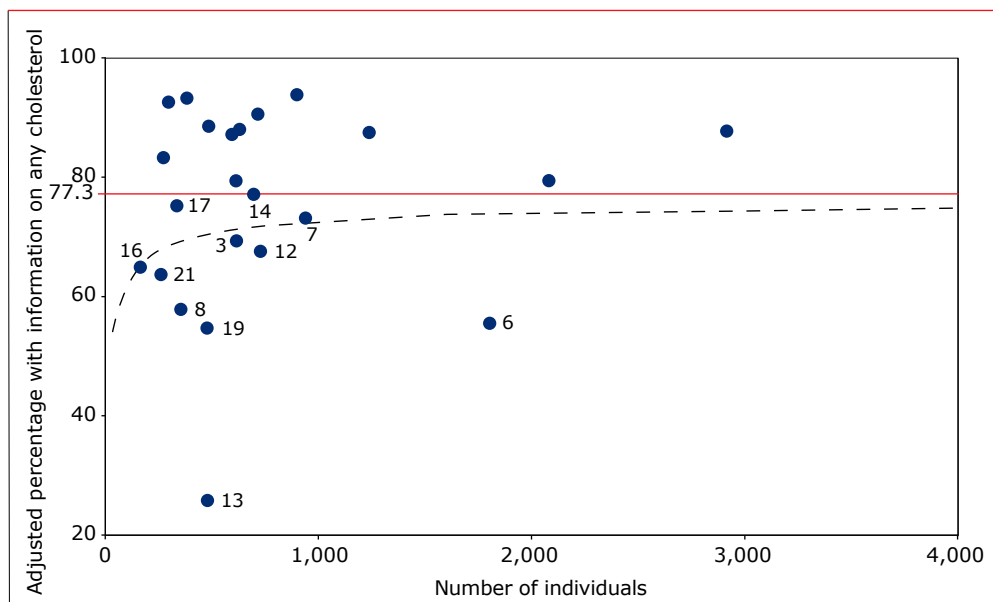
Figure 10.11: Information on smoking; in other words, individuals who ever had information on their smoking status in 2024. The percentage with information on smoking has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for individuals 40 years old or older. Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 10.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

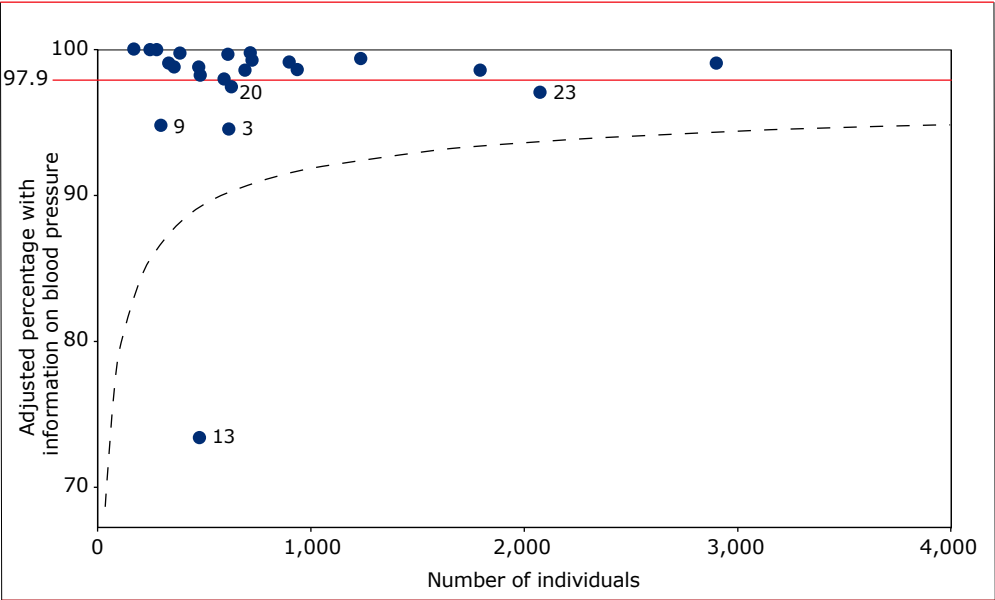


Figure 10.12: Information on any cholesterol; in other words, individuals who had a total, HDL or LDL cholesterol measurement in 2024. The percentage with information on total cholesterol has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for individuals 40 years old or older. Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 10.1. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

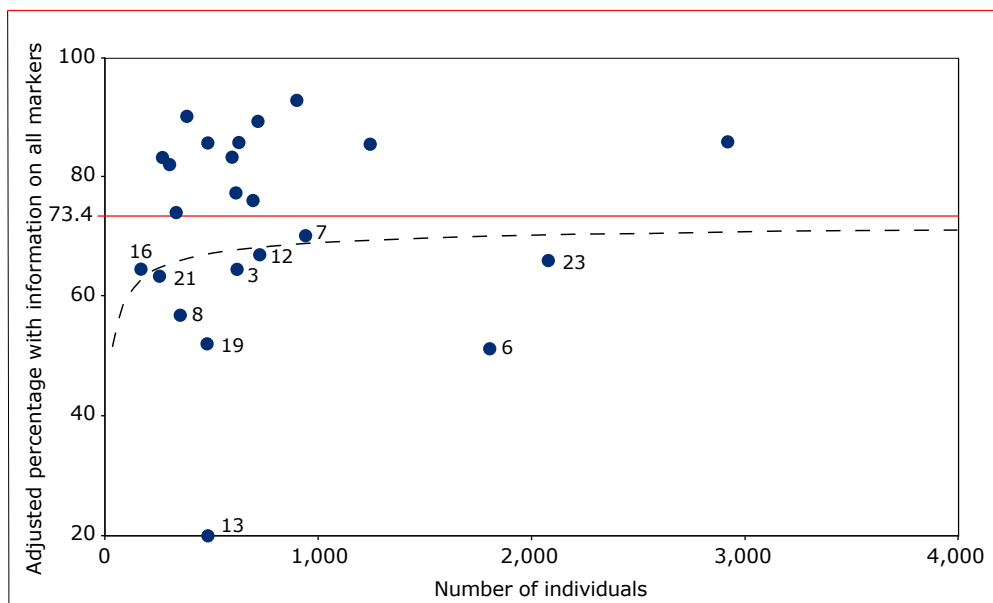
Figure 10.13: Information on blood pressure; in other words, individuals who had a blood pressure measurement in 2024. The percentage with information on blood pressure has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for individuals 40 years old or older. Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 10.1. The “lower” boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

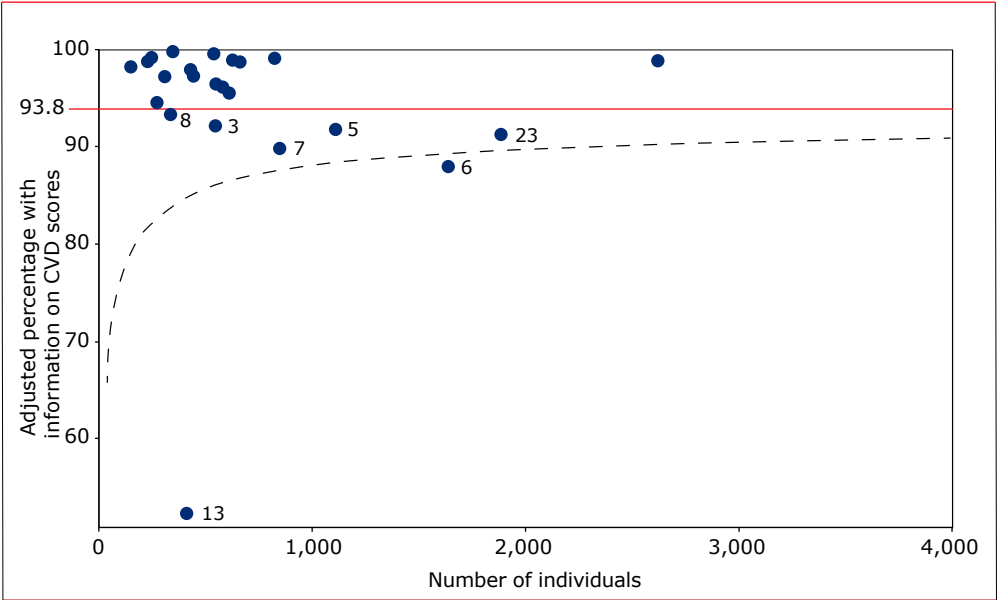


Figure 10.14: Information on all cardiovascular parameters; in other words, individuals who had total, HDL, LDL cholesterol and blood pressure measurement in 2024. The percentage with information on all cardiovascular parameters has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for individuals 40 years old or older. Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 10.1. The “lower” boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

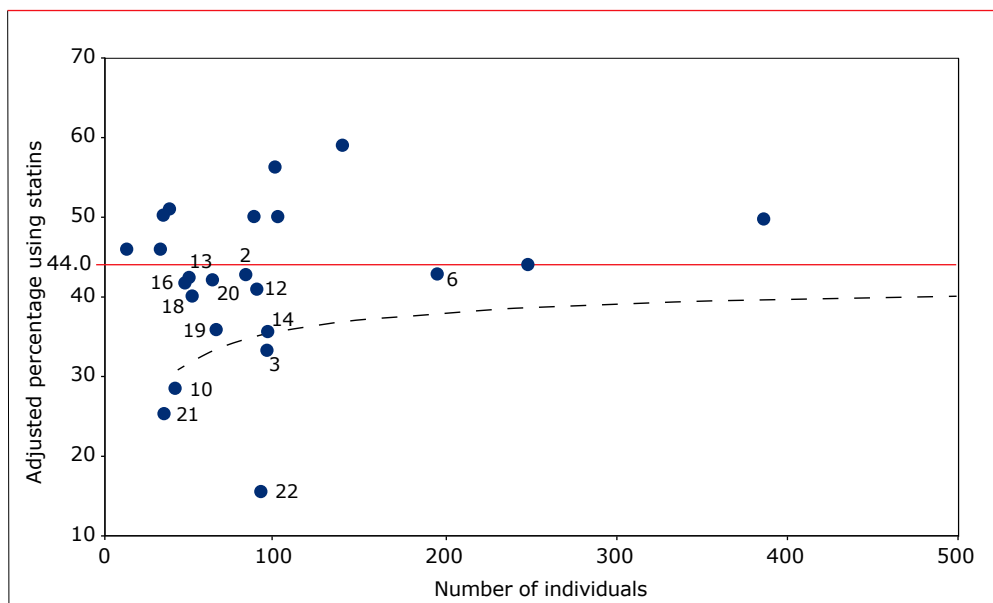
Figure 10.15: Information on cardiovascular event risk in 2024. The percentage with information on cardiovascular event risk assessment has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: The indicator represents individuals who had enough information to have their cardiovascular disease assessed by the SCORE2 (40–69 year olds) or SCORE2-OP (70 year olds or older). Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 10.1. The “lower” boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

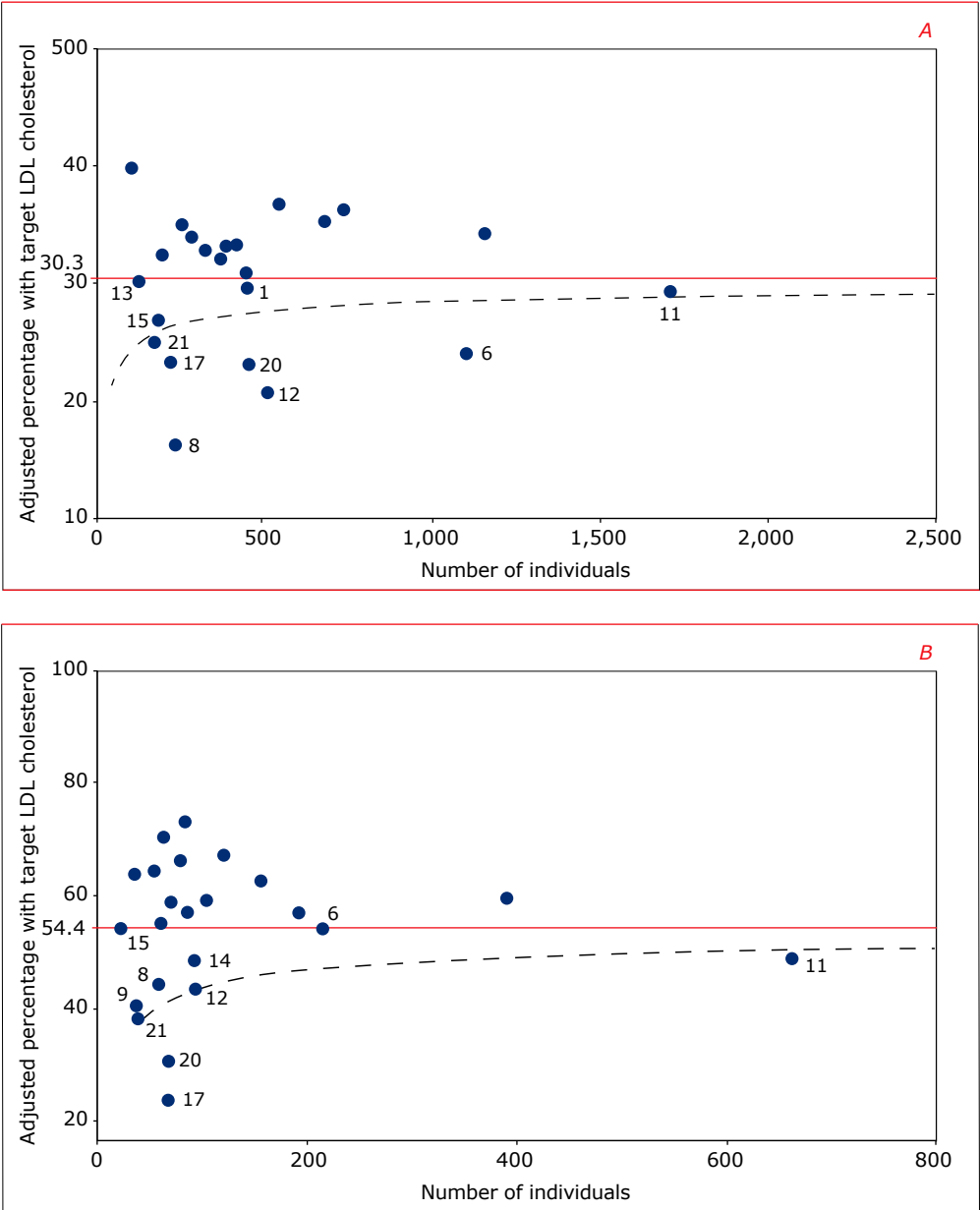


Figure 10.16: Statin use; in other words individuals who had a predicted 10-year cardiovascular event risk-score greater than 10%, using the SCORE2(-OP) and received a prescription for statins in 2024. The percentage with statin use has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for those whose predicted 10-year cardiovascular risk were assessed with SCORE2 (i.e., 40-69 year olds) or SCORE2-OP (i.e., 70 year olds or older). Data points with centre numbers below the national average are labelled. Centre numbers correspond to those used in Figure 10.1. The “lower” boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

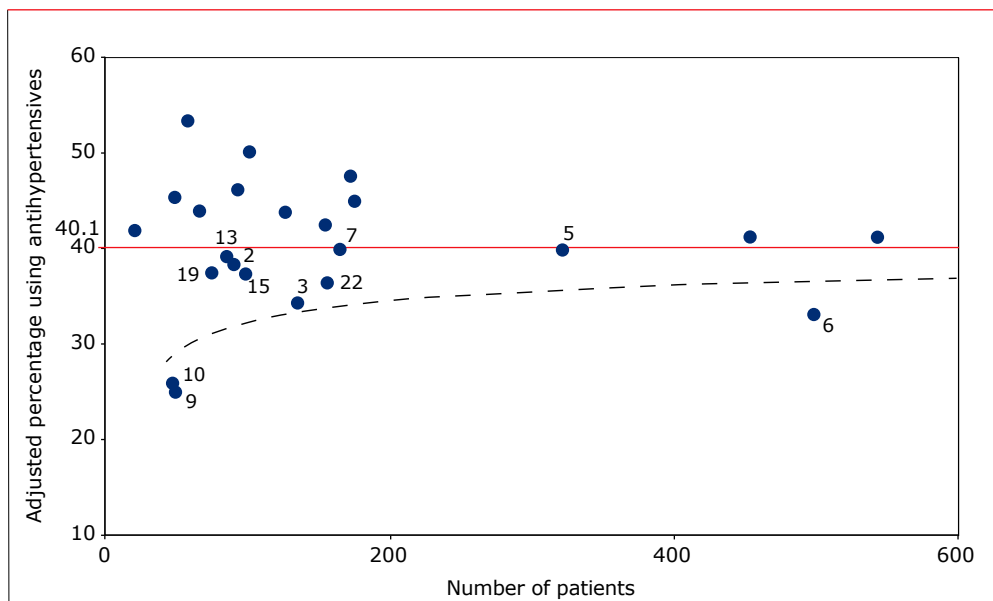
Figure 10.17: Target LDL cholesterol; in other words, individuals who had a predicted 10-year cardiovascular event risk-score greater than 10%, using the SCORE2(-OP), without (A) or with a prescription for statins (B), and had an LDL cholesterol level ≤ 2.6 mmol/mL in 2024. The percentage with target LDL cholesterol has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for those whose 10-year cardiovascular risk were assessed with SCORE2 (i.e., 40–69 year olds) or SCORE2-OP (i.e., 70 year olds or older). The “lower” boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

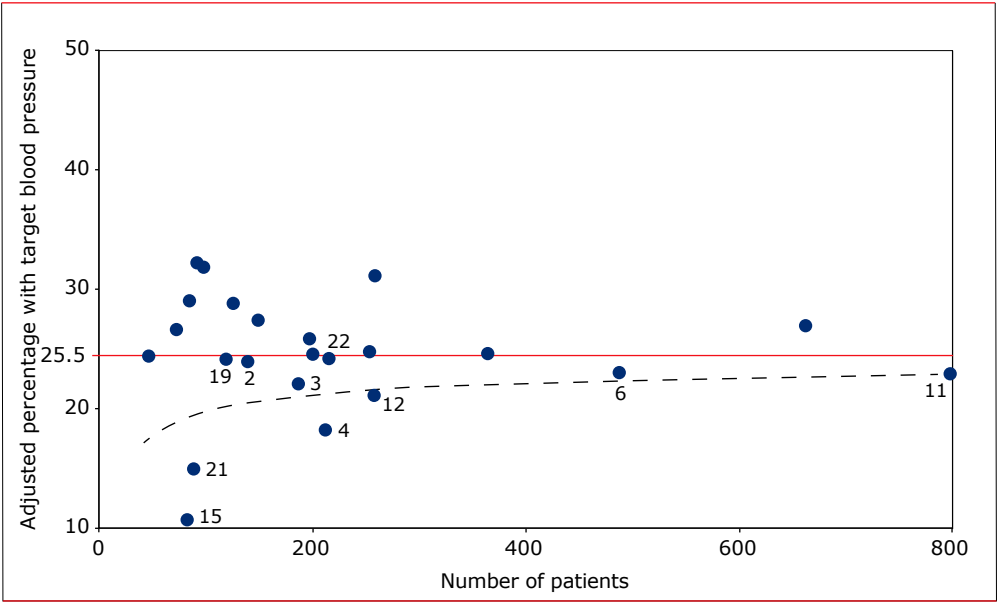


Figure 10.18: Antihypertensive medication use; in other words, individuals who had high blood pressure and received a prescription for antihypertensive medication in 2024. The percentage with antihypertensive medication use has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Data are provided for those who had high blood pressure, defined as ever having a diastolic blood pressure ≥ 90 mmHg. The "lower" boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).

Figure 10.19: Target blood pressure; in other words, individuals who were receiving antihypertensive medication and had a blood pressure below age-specific thresholds in 2024. The percentage with target blood pressure has been adjusted for patient mix and is plotted as a function of the number of individuals who entered care.



Legend: Age-specific thresholds refers to the following: systolic blood pressure <130 mmHg and diastolic blood pressure <80 mmHg (for those 18–64 years old), or a systolic blood pressure <140 mmHg and diastolic blood pressure <80 mmHg (for those 65 years old or older). Data are provided for those on antihypertensive medication. The “lower” boundary of expected percentage retained in care (as compared to the national average) is indicated with a dashed line (Box 10.2).



Key findings and conclusions

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

- In 2024, the national average for having data available were: 99% for smoking, 98% for blood pressure, 77% for total-, HDL- or LDL- cholesterol. However, there was substantial variation in the percentage of individuals with information on total, HDL- or LDL- cholesterol across centres. This led to a number of centres with percentages of information needed for cardiovascular disease screening that were much lower-than-expected compared to the national average.
- In 2024, the national average for having all the information to predict 10-year risk of a cardiovascular event was 94%. However, two centres had percentages that were lower-than-expected compared to the national average.
- More than 80% of individuals 40 years or older had information on their predicted 10-year risk of a cardiovascular disease event for all but one centre. For one centre, this percentage was much lower-than-expected compared to the national average. Nevertheless, many of the centres demonstrated marked improvement in this indicator over the past five years.
- Among those with a high (i.e., 10%) predicted 10-year risk of a cardiovascular disease event, when using the SCORE2(-OP), there was substantial variation in the percentage who received a prescription for statins. Although some centres have shown increases in the percentage with high cardiovascular disease risk who received statins over the past five years, this percentage remains low nationally. Based on the former recommendations, 44% of the individuals with high risk had a statins prescription in 2024. When high cardiovascular disease risk was based on the updated recommendations, to only 28% of the individuals with a high predicted 10-year CVD risk statins were prescribed.
- Among those with a high predicted 10-year risk of a cardiovascular disease event, when using the SCORE2(-OP), there was some variation in the percentage with target LDL cholesterol when individuals had a prescription for statins. The national average in 2024 was 54%. Three centres, however, had a much lower-than-expected percentage with target LDL for this specific group. There was less variation in the percentage with target LDL cholesterol when individuals did not receive a prescription for statins, but this percentage was high across all centres.
- Overall, 40% of the individuals with high blood pressure in 2024 received an antihypertensive prescription. There was also slight between-centre variation in the percentage of individuals with high blood pressure who received an antihypertensive prescription and some centres have shown decreases in the percentage of individuals with high blood pressure who received an antihypertensive prescription. However, when individuals with high blood

pressure were stratified according to their grade of hypertension, antihypertensive prescription increased with grade of hypertension. Likewise, there was slight between-centre variation in the percentage of individuals taking antihypertensive medication who had achieved a target blood pressure. For most centres, these percentages were similar over the last five years. Some of the HIV treatment centres had levels of these indicators that were much lower-than-expected when compared to the national average of 24%.

Nevertheless, these conclusions must be considered in light of the data collection methods used by SHM. Much of the data is obtained through electronic medical records, which might have incomplete information on items, such as smoking status and antihypertensive medication. Furthermore, primary prevention of cardiovascular disease for many of the smaller centres is commonly done by general practitioners or periphery healthcare centres. There remains a possibility that in some cases information may be missed in the data collection. Certain data related to cardiovascular disease could be missing simply because these data are not measured at the HIV treatment centre. We were not able to include people without the information to predict 10-year risk of a cardiovascular event when analysing the indicators on statin and antihypertensive medication. Finally, we do not have the specific reasons why people are not taking antihypertensive medications or statins, which could be unrelated to the care given at the HIV treatment centre.

Care related to cardiovascular disease does have variation across centres. Nevertheless, certain centres should strive to increase the percentage of individuals with information on cholesterol measurements and risk assessment of cardiovascular disease events. Less than half of the of individuals with a predicted high 10-year risk of a cardiovascular event used statins and this national average was lower under the updated recommendations to assess high 10-year risk. This analysis provides insight into the provision of cardiovascular diseases care at the different treatment centres.



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1. Verheij, E., et al., *Long-term evolution of comorbidities and their disease burden in individuals with and without HIV as they age: analysis of the prospective AGEHIV cohort study*. The lancet. HIV, 2023. **10**(3): p. e164-e174.
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