Primary care consultations and costs among HIV-positive individuals in UK primary care 1995-2005: a cohort study

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Primary care consultations and costs among HIV-positive individuals in UK primary care 1995–2005: a cohort study

H E R Evans,1 A Tsourapas,2 C H Mercer,1 G Rait,3 S Bryan,2 M Hamill,4 V Delpech,5 G Hughes,5 G Brook,6 T Williams,7 A M Johnson,8 S Singh,3 I Petersen,3 T Chadborn,5 J A Cassell9

ABSTRACT
Objectives: To investigate the role of primary care in the management of HIV and estimate primary care-associated costs at a time of rising prevalence.

Methods: Retrospective cohort study between 1995 and 2005, using data from general practices contributing data to the UK General Practice Research Database. Patterns of consultation and morbidity and associated consultation costs were analysed among all practice-registered patients for whom HIV-positive status was recorded in the general practice record.

Results: 348 practices yielded 5504 person-years (py) of follow-up for known HIV-positive patients, who consult in general practice frequently (4.2 consultations/py by men, 5.2 consultations/py by women, in 2005) for a range of conditions. Consultation rates declined in the late 1990s from 5.0 and 7.3 consultations/py in 1995 in men and women, respectively, converging to rates similar to the wider population. Costs of consultation (general practitioner and nurse, combined) reflect these changes, at £100.27 for male patients and £117.08 for female patients in 2005. Approximately one in six medications prescribed in primary care for HIV-positive individuals has the potential for major interaction with antiretroviral medications.

Conclusion: HIV-positive individuals known in general practice now consult on a similar scale to the wider population. Further research should be undertaken to explore how primary care can best contribute to improving the health outcomes of this group with chronic illness. Their substantial use of primary care suggests there may be potential to develop effective integrated care pathways.

The prevalence of HIV in the UK has increased since the introduction of highly active antiretroviral therapy (HAART) in the mid 1990s, which improved the survival of HIV-positive individuals. It also reflects changing patterns of international migration. An estimated 77 400 individuals were living with HIV by 2007.1

UK residents are eligible to “register” free of charge with a general practitioner (GP) or primary care practice, which provides most routine care and can refer for specialist consultation. HIV-related medical care is unusual within the UK in being delivered largely by specialist services, in which many HIV-positive individuals have also obtained some of the care usually provided by a GP.2 Improved survival and increasing prevalence presents challenges for these traditional models of HIV care, as the scope of care required and the number of patients both expand. This is likely to continue with the increasing move to normalise HIV testing.2 Although antiretroviral drugs are still prescribed only by specialist services, with very rare exceptions, the transformation of HIV into a chronic disease presents new challenges for the UK health services (NHS) in preventive and long-term care, which is generally the domain of primary care.3 Wider changes in NHS commissioning and delivery, such as the establishment of Quality and Outcomes Framework payments rewarding the management of chronic disease,4 have highlighted the need to develop and evaluate more holistic models of care for a surviving and ageing cohort of HIV-positive individuals, whose medical needs and mortality rates closely approximate those of the general population.1 4 6

Little is known about existing patterns of care for HIV-positive individuals in UK primary care. At least half,7 and possibly up to 78% of people living with HIV have disclosed their status to a GP.5 There is anecdotal evidence that many seek regular care, containing anonymised data on 4.7% (2.8 million in 2005) of the UK population. It is broadly demographically representative, and has been widely used and validated in pharmacoepidemiological, epidemiological and public health research.10

METHODS
Population and sampling
The population studied was derived from the General Practice Research Database (GPRD), described elsewhere.10 Briefly, the GPRD is a database of computerised clinical records in primary care, containing anonymised data on 4.7% (2.8 million in 2005) of the UK population. It is broadly demographically representative, and has been widely used and validated in pharmacoepidemiological, epidemiological and public health research.10

See Editorial, p 486 and linked paper, p 520

Additional supplemental tables 1 and 2 are published online only at http://sti.bmj.com/content/vol85/issue7
The data include descriptions of symptoms, investigations and diagnoses, as Read or OXMIS (Oxford Medical Information Systems) codes, with data on prescriptions, consultations, age and gender and region, at the level of the strategic health authority.

We studied all individuals recorded as HIV positive and registered in a GPRD practice at any time from 1995 to 2005 inclusive. A patient started contributing to the study on the latest of three possible dates: the date when an HIV-positive code was first recorded; the date when the patient first registered with the practice; or when the practice provided up-to-standard data. A patient stopped contributing either on being recorded as “transferring out” of the practice (when a patient moves out of the practice or dies) or on the practice’s last collection date, whichever was earlier.

Practices could contribute data to the GPRD only when they met data quality requirements and data recorded before this was discarded. A total of 389 practices contributed to the GPRD between 1995 and 2005. When a practice stopped contributing it was not replaced, but practices could join at any time.

Consultation rates and economic costing
We measured the annual rate of face-to-face, telephone and home visits with GPs and practice nurses from 1995 to 2005, as recorded in the GPRD, using person-years as the denominator. We estimated personnel costs of consultation using published unit costs\(^1\) to cost GP and nurse consultations. The cost year for the analysis was 2005–6. The number of consultations was restricted to one GP and one nurse consultation per day per patient to minimise the inadvertent duplication of consultations as a result of, for example, entering administrative data. The type of consultation, which is selected by the member of staff entering the records, was classified as face-to-face, telephone and out of hours/home visits (combined), and costed accordingly. The data available did not allow reliable estimation of the costs of prescriptions, tests or referrals.

In order to compare consultation patterns among HIV-positive individuals with the wider population we needed to compare these with consultation patterns among individuals of comparable age and gender. We therefore directly age-standardised our study population to published estimates of consultation rates,\(^2\) estimated from the QResearch database. This is also based on a widely used general practice software system. We could not compare with consultation rates in the general population using the GPRD because our data licence was restricted to our study population and no published estimates are available. Similarly, we cannot compare consultation patterns for specific morbidities with the wider population.

Comparison with consultation rates in specialist HIV services was not possible because these data record only in aggregate the proportion of quarter years in which at least one attendance occurs, and the number of attendances per patient cannot be inferred.

Estimated medication costs of specific antiretroviral therapies published at the end of the 2005–6 financial year were also identified in order to compare the magnitude of primary care consultation costs and HAART costs.\(^3\)

HIV morbidity and clinical care
Consultation rates were calculated for the following preselected general categories of common and/or HIV-related morbidities among prevalent HIV cases: upper respiratory infections, lower respiratory infections, tuberculosis, sore throat, skin infections and other skin conditions, non-Hodgkin's lymphoma, fungal infections, herpes zoster, headache, gastrointestinal symptoms, gastrointestinal infections and mental health-related problems. These were selected by the authors as common problems presenting in HIV-positive individuals, based on the experience of specialist centres, but which need not necessarily indicate a need for specialist care.

Finally, classes of drugs considered by HIV specialists to present a high potential for adverse interactions with commonly used HIV antiretroviral medications were identified, through a workshop held at a specialist HIV care centre, at which the opinions of clinicians expert in the care of HIV were consulted by the clinical authors of the paper and consensus was reached.

Ethical approval was given by the Independent Scientific Advisory Committee of GPRD under delegated authority.

Analysis
We estimated the following:

- GP and nurse consultation rates among HIV patients known to primary care by gender and HIV morbidity, compared with consultation rates for the GP-registered population;
- The cost of GP and nurse consultations per patient by year and by gender;
- Consultation rates for selected morbidities;
- The proportion of all prescriptions in 2005 that included a medication considered to present a high potential for adverse interaction with HIV medications.

A detailed analysis of consultation patterns was performed for 2005, in which patients were categorised by gender, level of deprivation, age and area of residence, and the rates for these different categories were estimated. Four categories were used to ascribe area of residence: London; urban (area outside of London); intermediate and rural. Level of deprivation was classified into lower, middle and upper quartiles. Possible factors associated with a rise/fall in consultation rates were investigated. Variables were considered in a multivariable analysis if they were shown to be significant (\(p<0.05\)) in the univariable analysis. All first-level interactions were investigated by adding them to the multivariable model consecutively. Interactions between covariates that were non-ignorable were defined as having hazard ratios that were less than 0.7 or greater than 1.3 and the global p value was \(p<0.05\). Non-ignorable interactions identified were dealt with through stratification.

Poisson regression was used to calculate incidence rate ratios for consultations. The standard errors for the incidence rate ratios were adjusted to take account of within-patient clustering of consultations. All analyses were performed using STATA (version 9.0).

RESULTS

Population available for analysis
Data were available for a total of 1438 men and 751 women recorded as HIV positive, derived from 348 practices. Supplemental table 1 (available online only) describes the demographic profile of these individuals and supplemental table 2 (available online only) summarises the size of the individual study populations available for each year 1995–2005. The median duration of contribution by practices was 11 years (interquartile range (IQR) 7, 11 years; range 5 months to 11 years to the nearest month). The median follow-up time for all men and women in the GPRD is 5 years (IQR 2 years and...
9 weeks to 8 years (24 weeks) and 5 years and 16 months (IQR 2 years and 42 weeks to 9 years), respectively.

Consultation rates among HIV-positive patients

Total consultation rates (GP, nurse, face-to-face and by phone) in 1995 were 5.0/person-year (py) for men and 7.3/py for women, and face-to-face GP consultations were 4.0/py and 6.0/py, respectively. These had dropped by 2005 to 4.2/py, 5.2/py, 3.1/py and 3.5/py, respectively. Figure 1 shows face-to-face consultation rates among HIV-positive individuals in the GPRD, in comparison with the wider practice population. Whereas crude consultation rates declined gradually, standardisation to the registered general practice population reveals a more marked drop in face-to-face consultation rates after the widespread introduction of HAART around 1996, which was not paralleled in the population as a whole. Figure 2 describes consultation patterns among HIV-positive individuals by consultation type. Nurse consultations followed a steady upward trend throughout the period of study in line with national trends.12

Table 1 reports a multivariable analysis of consultation rates by gender, age and deprivation level for 2005, the most recent year studied. These analyses were stratified by area of residence because of significant interactions with the demographic variables studied. Overall, primary care consultation rates increased with increasing rurality. Consultation rates were also higher among women compared with men in urban areas, with the largest gender difference observed for individuals living in London: adjusted incidence rate ratio 1.45 (95% CI 1.11 to 1.91). There were no significant associations with age, except among individuals living in urban areas outside of London, where consultation rates increased with age. Level of deprivation was not associated in any of the three area types considered.

Cost of primary care consultation among HIV patients

Details of an economic analysis of consultation costs are presented in supplemental table 2 (available online only). A decline in the total costs of consultations (GP and nurse combined) was seen for female patients from £211.59 in 1995 to £117.08 in 2005. In male patients, the total costs of consultations (GP and nurse combined) decreased from £147.26 in 1995 to £86.29 in 2001, whereas they increased to £100.27 in 2005. The total cost of GP consultations was substantially higher than the total cost of practice nurse consultations, as a result of a higher GP consultation rate and a higher GP unit cost.

Consultation rates by morbidity

Figure 3 shows consultation rates among HIV-positive individuals for selected morbidities over the period 1995–2005. Consultation occurs most commonly for respiratory infections, with an average rate of 240.1 (95% CI 184.4 to 312.3) per 1000 py for upper respiratory infections and 253.2 (95% CI 195.8 to 327.6) for lower respiratory infections. Consultation rates for respiratory infections, sore throat and skin disease dropped between 1995 and 1998, with the biggest drop in upper respiratory infections at 240.1 (95% CI 184.4 to 312.3) in 1995 to 115.7 (95% CI 101.0 to 132.4) in 1998 and skin disease at 155.3 (95% CI 95.2 to 192.4) to 47.4 (95% CI 38.3 to 58.5).

In this sample, 37.3% of men and 27.0% of women contributing data during 2005 had been recorded at some time...
as having either symptoms or a diagnosis of mental health problems since their first recorded HIV-positive record.

**Prescriptions**

The proportion of prescriptions to HIV-positive individuals that were considered to have a major potential to interact with HIV medication was 17.4% (95% CI 16.8% to 18.1%) in 2005, with no significant change between 1995 and 2005. Benzodiazepines were the most frequently prescribed drug type, contributing 21.6% of all potential HIV medication-interacting prescriptions, followed by anti-inflammatory (18.2%), antacid (15.7%), antidepressant (15.2%), diuretic (9.2%) and lipid-lowering agents (8.6%). (Note that many of these may have been initiated in specialist care and then continued by the GP).

**DISCUSSION**

Primary care consultation is frequent among HIV-positive individuals known to the GP, but declined in the mid-1990s, following the introduction of HAART, reaching similar rates to the general population. This decline may reflect decreasing morbidity as a result of antiretroviral therapy. Consultation frequency remains higher outside London and among older adults, the latter reflecting wider trends to increased consultation above the age of 45 years. HIV-positive individuals, who are known to their GPs, consult frequently in primary care for a wide range of problems, including respiratory, gastrointestinal and dermatology conditions. A third of patients have had a mental health-related consultation since their first HIV diagnosis record.

Our study provides for the first time a description of primary healthcare provision to patients recorded as HIV positive in the UK setting, building on previous studies that looked at selected groups and the recently diagnosed. The marked drop seen in GP consultation rates, following the widespread introduction of HAART, was not seen in the wider population, but a subsequent steady state in GP consultations, alongside a substantial rise in nurse consultations, reflects trends in the wider population. As in the USA, women consult in primary care more frequently than men. Our data confirm both high rates of mental health-related consultations reported in HIV-positive individuals, and demonstrate that primary care staff are aware of these conditions. Mental health problems are known to be associated with poor adherence to HAART. This is also of public health relevance because HIV-positive men with depression are more likely to engage in unprotected anal intercourse.

A major strength of this study is the use of the primary care records, created in real time, of a large cohort of unselected HIV-positive individuals. However, there are a number of limitations. We do not know whether all patients with HIV known to their GP were captured, and we did not have access to the free text in the GPRD, which may provide additional information. Some HIV diagnoses may be euphemistically coded, recorded in free text or not recorded at all, in order to avoid disclosure to mortgage and life assurance agencies, or to receptionists and non-clinical practice staff. The date of first diagnosis (as opposed to the first date of a record appearing in the notes) may not be accurate unless the GP specifically recorded this by recording an “event date” different from the date of the record.

Figure 2  Primary care consultations among HIV-positive individuals with a general practitioner (GP) or nurse by consultation type (N = 10 292 consultations recorded for 2189 patients). The start date is the first date of recording any HIV-positive medical code. Consultations were restricted to one nurse and one GP consultation per day to avoid duplication. “All consultations” was defined as all face-to-face, phone and home visit/out-of-hours consultations combined.
frequent follow-up usual in monitoring HAART may account for the reduction in primary care consultations, because HIV patients’ primary care needs may be largely met during these specialist follow-up visits. Consultation behaviour may vary in relation to many factors. In particular, we are unable to explore the relation of sociodemographic factors, such as ethnicity, to consultation patterns among HIV-positive individuals or the wider population.

Our cost analysis focused on consultations only, excluding the cost of drugs, referrals and procedures. Costing of all items and comparison across time of these complex records, and comparison of detailed clinical data with the wider population, was not feasible within the resource constraints of this study. However, the cost of a typical HAART regimen in 2005 (abacavir, lamivudine and efavirenz) was £8208, dwarfing the consultation costs and any likely primary care prescribing costs, because antiretroviral drugs are not prescribed in primary care in the UK. The impact of the patients who have not disclosed to their GP on costs is hard to ascertain, as it is unclear whether they will use primary care more or less than those who have disclosed.

The frequent use of primary care we saw in HIV-positive individuals lends support to the view that GPs could play a major role in the maintenance of health in this population. Our data also suggest that interventions to improve care in chronic illness demonstrated in recent years across a wide range of conditions are likely to be applicable here because a high proportion of HIV-positive individuals do use primary care extensively. However, the extent of non-registration with general practice is not known, and could have an impact on the potential of such interventions.

Trials of shared care between GPs and specialists, which notably failed to recruit in the UK before the era of HAART, 22

Table 1: Demographic factors associated with primary care consultation rates (per person-year) among HIV-positive individuals by area of residence in the UK in 2005

<table>
<thead>
<tr>
<th>Demographic factors</th>
<th>No of consultations</th>
<th>Consultation rate/py</th>
<th>Crude IRR (95% CI)</th>
<th>Adjusted IRR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>London (n = 565 individuals)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1656</td>
<td>3.73</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>972</td>
<td>3.23</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>684</td>
<td>4.79</td>
<td>1.48 (1.15 to 1.90)</td>
<td>1.45 (1.11 to 1.91)</td>
</tr>
<tr>
<td>Age, grouped, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16–24</td>
<td>58</td>
<td>6.45</td>
<td>1.62 (1.04 to 2.54)</td>
<td>1.39 (0.90 to 2.17)</td>
</tr>
<tr>
<td>25–34</td>
<td>288</td>
<td>3.98</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>35–44</td>
<td>785</td>
<td>3.64</td>
<td>0.92 (0.68 to 1.24)</td>
<td>0.93 (0.69 to 1.26)</td>
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<tr>
<td>45+</td>
<td>525</td>
<td>3.57</td>
<td>0.90 (0.63 to 1.28)</td>
<td>0.97 (0.67 to 1.40)</td>
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<td>Deprivation level</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lower quartile (least deprived)</td>
<td>6</td>
<td>1.33</td>
<td>1</td>
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<tr>
<td>Middle quartiles</td>
<td>1063</td>
<td>3.86</td>
<td>2.58 (0.41 to 16.01)</td>
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</tr>
<tr>
<td>Upper quartile (most deprived)</td>
<td>587</td>
<td>3.57</td>
<td>2.38 (0.38 to 14.92)</td>
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</tr>
<tr>
<td>Urban areas outside London (n = 774 individuals)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>2899</td>
<td>4.52</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1729</td>
<td>4.22</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>1170</td>
<td>5.04</td>
<td>1.19 (1.01 to 1.41)</td>
<td>1.30 (1.09 to 1.54)</td>
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<tr>
<td>Age, grouped, years</td>
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<td></td>
<td></td>
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<tr>
<td>16–24</td>
<td>93</td>
<td>3.29</td>
<td>0.74 (0.49 to 1.22)</td>
<td>0.71 (0.47 to 1.08)</td>
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<tr>
<td>25–34</td>
<td>722</td>
<td>4.39</td>
<td>1</td>
<td>1</td>
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<tr>
<td>35–44</td>
<td>1020</td>
<td>3.99</td>
<td>0.91 (0.74 to 1.12)</td>
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<td>45+</td>
<td>1064</td>
<td>5.51</td>
<td>1.26 (1.03 to 1.53)</td>
<td>1.37 (1.12 to 1.67)</td>
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<tr>
<td>Deprivation level</td>
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<td></td>
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<tr>
<td>Lower quartile (least deprived)</td>
<td>373</td>
<td>4.7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Middle quartiles</td>
<td>1476</td>
<td>4.19</td>
<td>0.89 (0.69 to 1.15)</td>
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<tr>
<td>Upper quartile (most deprived)</td>
<td>1050</td>
<td>4.98</td>
<td>1.06 (0.82 to 1.38)</td>
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<tr>
<td>Rural-intermediate areas outside London (n = 94 individuals)</td>
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<tr>
<td>All</td>
<td>588</td>
<td>5.65</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>402</td>
<td>5.61</td>
<td>1</td>
<td>–</td>
</tr>
<tr>
<td>Female</td>
<td>186</td>
<td>5.73</td>
<td>1.02 (0.67 to 1.55)</td>
<td>–</td>
</tr>
<tr>
<td>Age, grouped, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>16–34*</td>
<td>96</td>
<td>4.41</td>
<td>1</td>
<td>–</td>
</tr>
<tr>
<td>35–44</td>
<td>193</td>
<td>5.53</td>
<td>1.25 (0.73 to 2.16)</td>
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<tr>
<td>45+</td>
<td>299</td>
<td>6.29</td>
<td>1.43 (0.85 to 2.38)</td>
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<tr>
<td>Deprivation level</td>
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<td>4.88</td>
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<td>–</td>
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<tr>
<td>Middle quartiles</td>
<td>303</td>
<td>5.76</td>
<td>1.18 (0.73 to 1.91)</td>
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<tr>
<td>Upper quartile (most deprived)</td>
<td>118</td>
<td>6.82</td>
<td>1.40 (0.83 to 2.35)</td>
<td>–</td>
</tr>
</tbody>
</table>

*Age groups 16–24 and 25–34 were collapsed into one category due to small numbers. This category corresponds to five consultations among two individuals aged 16–24 years and 91 consultations among 21 individuals aged 25–34 years. IRR, incidence rate ratio; py, person-year.
need to be revisited in the context of HIV as a chronic disease, with an associated shift in emphasis towards early diagnosis and health promotion. While communication with the GP is recommended in guidelines for HIV specialists, it is not yet normalised. However, findings from observational studies suggest that when the HIV viral load is well controlled, the frequency of specialist monitoring can be reduced without compromising the clinical outcome. HIV management, seen as the optimal management of the overall health of HIV-positive individuals, has the potential to be improved through the development of a better interface between primary and secondary care. At present, a high proportion of prescriptions issued to known HIV-positive individuals are of medications with potential for interaction with HIV medications. These may well be unproblematical in this group whose GPs are aware of their HIV diagnosis—and may have been initiated in the specialist setting. If paralleled in the half of all HIV-positive individuals who do not have their HIV diagnosis recorded, and whose GP may not be aware of it, there is potential for avoidable adverse drug interactions. This finding, in the context of rapidly evolving and complex HIV medication regimes, emphasises the need to develop more effective communication between GPs, patients and HIV specialists in order to minimise the risks of inadvertent drug prescribing and unnecessary investigation. Even in the pre-HAART era, registration with GPs was surprisingly high among HIV-positive individuals, but the role of the GP at that time was to support the patient through the process of declining health and death. The role of the GP in HIV is very different now because holistic, preventive care for patients, and often their families, involves supporting and managing wider health problems. The provision of smoking cessation advice, blood pressure, lipid control and contraception need to be addressed if HIV-positive individuals are to maximise the opportunities to improve quality of life and increase lifespans afforded by HAART.

Our earlier study showed higher rates of disclosure to primary care outside London than in the capital. The data presented here show that HIV-positive individuals also use primary care more outside London, suggesting that models of care appropriate to HIV as a chronic illness may be emerging more rapidly, perhaps through necessity, outside the more concentrated HIV epidemic and extensive HIV services of London. It is important to explore how primary care can improve health outcomes in this group, as their primary care use suggests that integrated care could be provided.

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