NHS Health Scotland

Who is least likely to attend? An analysis of outpatient appointment 'Did Not Attend' (DNA) data in Scotland

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1 Summary

Aim

This project aimed to identify potential inequities in access to NHS services in Scotland by identifying differences in the risk and rate of patients not attending outpatient appointments.

Methods

Routinely collected annual data on Did Not Attends (DNAs) for first outpatient appointments in Scotland were obtained from the Information Services Division (ISD) of NHS National Services Scotland (NSS) for 10 financial years (2002/03–2011/12). First, and not second or third appointments, were used because of quality issues with the data for the later appointments. An appointment was defined as DNA if a patient did not attend and gave no prior warning. The data were supplied in crude and aggregated form, including the age standardised percentage of appointments resulting in a DNA and age- and deprivation-standardised DNA rates. The data were grouped by sex, age group, clinical specialty, Scottish area deprivation decile (Scottish Index of Multiple Deprivation (SIMD)) and 'area type' using an eight category urban to rural scale ('rurality') for the stratified analyses.

Specialties were selected for analysis if they were found to have a large enough number of DNAs to enable analysis and these included: dental; dermatology; ear, nose and throat; gastroenterology; general medicine; general psychiatry; general surgery; gynaecology; neurology; and urology. Trends over the 10-year period were examined by sex, age group by sex, SIMD by sex, and area type ('rurality') by sex.

Results

Almost 10% of all first outpatient appointments between 2002/03 and 2011/12 resulted in a DNA and, in general, the patterning of DNAs by deprivation, urban-rural classification, sex and age was stable. There was a slight decline in DNA risk, but little or no change in rates, over time.

The risk of DNA was higher for men than women overall and for men within a variety of population groupings:

- **SIMD:** within the most deprived decile the risk for females was 14% and 17% for males; within the least deprived deciles the risk for females was 6% and 7% for males.
- **area type (rurality):** within large urban areas the risk for females was 11% and 13% for males; within very remote rural areas the risk for females was 6% and 7% for males.

- **age group:** for those aged 15–29 years the risk for females was 13% and 17% for males; whilst for those aged 65–74 years the risk for females was 5% and 5% for males.
- **specialty:** for all specialties the risk for females was 9% and 11% for males; whilst for general psychiatry the risk for females was 17% and 20% for males.

Although males were at higher risk of DNA, the population rate of DNA per 100,000 per year was greater for females because they had a far greater number of appointments. These differences were not due to age or deprivation differences between sexes.

The DNA risk, DNA rates and age-adjusted DNA rates all increased with greater deprivation in both men and women. The highest DNA risk and rates were in large urban areas, with generally lower risks and rates in more remote and rural areas, and this was not explained by differences in deprivation or age.

Outpatients in general psychiatry had the greatest risk of DNA (females 17%; males 20%) compared to the mean for all specialties (females 9%; males 11%). Outpatients in neurology (females 11%; males 13%) and urology (females 11%; males 12%) were also at higher than average risk of DNA. General psychiatry also had the most marked social patterning in the provision of appointments with populations in the most deprived areas accounting for the majority of appointments. This suggests that the DNAs for general psychiatry have one of the largest population impacts on inequity in access out of the ten selected specialties.

The largest age standardised rates for DNA in 2011/12 differed for males and females. The highest female rate was for gynaecology (468 DNAs per 100,000 population per year). Rates were highest for males in ear, nose and throat (females 244 and males 276 per 100,000 per year), followed by dermatology (females 252; males 205) and urology (females 81; males 223).

Implications

More work is required to understand why DNAs occur differentially and this may help us reduce DNAs in the future. Both patient and service factors can contribute to DNAs and there are a number of practical steps that services can take to improve patient attendance and, ultimately, retention across their care pathway. The results from this report highlight those population groups least likely to attend first outpatient appointments, and that these groups tend to be correlated with populations with poorer health, lower resource or more complex needs. To maximise services' effectiveness in mitigating the effects of health inequalities it is important that, as one of many actions towards achieving this outcome, universal approaches to reduce DNAs are both tailored and applied with a scale and intensity proportionate to need.

A number of existing and developing initiatives exist to support the reduction of DNAs. Several local Health Boards are already using patient reminder systems, such as the NHS 24 Patient Reminder Service. The National Services Scotland (NSS) Discovery tool, due for launch in April 2015, will enable NHS Boards to monitor local DNA rates and potentially the impact of any new interventions by a number of factors including: DNA percentage, specialty and by quarter. Further information is available at: **www.nssdiscovery.scot.nhs.uk**

Conclusions

This study has shown that for every appointment the risk of DNA is highest among those living in more deprived areas, those living in urban areas, males, young adults and in general psychiatry settings. DNA rates have similar patterning to DNA risk with the exception of sex, where women have higher rates because of the greater number of outpatient appointments. The patterning of DNAs has been relatively stable for the past 10 years. Further work to examine why there is variation in the risk and rates of DNA between groups is required, including potential differences in needs, the barriers they face and system responses effective at improving equity of access.

2 Definitions

An appointment was defined as a **Did Not Attend** (DNA) if a patient did not attend and gave no prior warning.[1]

An **outpatient attendance** was defined as the occasion of a patient attending a consultant or other medical clinic or meeting with a consultant or senior member of his/her team outside a clinic session.

If the patient was a new outpatient then the attendance was a **new (first)** outpatient attendance, otherwise it was a **follow-up (return)** outpatient attendance.[2]

Specialty groups were defined as those specialties with clinical commonalities as categorised by ISD.

3 Introduction

There were 1,843,064 new (first) outpatient appointments (excluding A&E departments) in Scotland in 2011/12. Of those, almost 10% were coded as DNAs. Describing differences in DNA rates between population groups can help our

understanding of patterns of non-uptake of healthcare among different population groups and may represent inequalities in access to health care. Definitions of inequality require an injustice to be present. Equity – or fairness – in service accessibility (from the points of view of use, experience and benefit) is recognised in the literature as a likely contributor to the mitigation of health inequalities.[3-5] NHS Health Scotland defines health inequalities as follows:

> 'Health inequalities are systematic differences in health between different groups within a society, which are potentially avoidable and deemed unacceptable.'[6]

DNAs can be caused by a variety of factors. Structural service factors relating to inaccessibility, including physical location,[7] opening hours[8] and barriers such as language, stigma and cultural differences,[9 10] may all be important. However, the interplay between the accessibility of a service and the perceived worthiness of the attendee, or 'candidacy'[11 12] (both self-perceived and as perceived by the service provider) can also lead to differences in how likely particular groups are to 'get into, through and on' with services.[13] Morbidity differences can also affect attendance where the illness reduces the ability to navigate access to the healthcare system.[14] Variation in social and economic circumstances may mean certain times are inconvenient,[15] and/or that the perceived importance of the appointment may vary between social groups in and of itself, or in the context of wider life complexities. Within psychiatry, for example, one study found that alcohol and drug users had particularly high DNA rates.[14]

While it is recognised that services may employ different levels of over-appointment in the expectation that some DNAs will occur, DNAs can have an adverse effect on both service providers and patients. NHS Health Scotland's *Equally Well Review of Equality Health Data Needs in Scotland*[16] stated:

- Each outpatient appointment DNA costs NHSScotland an estimated mean of £120 (2012 figure).[17]
- If patients fail to attend appointments, the circumstances of the DNA and the urgency of the treatment will affect whether the patient is referred back to their GP or put back on the waiting list.
- Patients may also have a delay in treatment if their consultation cannot go ahead as planned if they had particular needs to be catered for at the appointment (e.g. translation services).

Ensuring that all groups access services according to their needs has the potential to reduce health inequalities and ensure equity between groups. A number of national and local initiatives are underway to improve equity in access to outpatient appointments. These include: the Transforming Outpatients Programme;[18] Patient-

Focused booking advocated within the Delivering Waiting Times CEL (2012);[19] and Management of Waiting Lists: Patients with additional support needs.[20]

4 Aim of report

This project aimed to identify potential inequities in access to NHS services in Scotland by identifying differences in the risk and rate of not attending outpatient appointments.

To that end, the objective was to describe the population rates and risk per outpatient appointment of DNA by age, sex, area deprivation (using the Scottish Index of Multiple Deprivation (SIMD))[21] and urban-rural classification[22] for all NHS outpatient appointments.

5 Methods

Data source

An appointment was defined as a Did Not Attend (DNA) if a patient did not attend and gave no prior warning.[1]

Aggregated first outpatient appointment DNA data were obtained from the Information Services Division (ISD) of NHS National Services Scotland for each financial year from 2002/03 to 2011/12 for NHSScotland (including both numerators and denominators and 95% confidence intervals calculated using Poisson distribution[23]) for all specialties and 10 selected specialties as follows:

a) number and percentage of DNAs by age group (0–14, 15–29, 30–44, 45–59, 60–64, 65–74, 75–89, 90+ years), by sex
b) number and percentage of DNAs by sex
c) number and percentage of DNAs by SIMD deciles by sex
d) number and percentage of DNAs by urban–rural classification (the Scottish Government eight group classification) by sex
e) European age standardised rate (EASR) for DNAs by sex
f) EASR for DNAs by SIMD deciles by sex
g) EASR for DNAs by urban/rural (eight groups) classification by sex
h) age and deprivation standardised DNA rates for sex
i) age and deprivation standardised DNA rates for urban/rural (eight groups) classification by sex

Data were not provided at individual level and where there were categories containing less than five DNAs the data were suppressed. First, and not second or third appointments were used because of quality issues with the data for the later appointments. There were missing demographic data for a small number of DNAs and these were excluded from the analysis.

Data analysis

For the analyses of DNAs by age strata, data were analysed in 15-year age bands with the exception of one five-year age band (60–64 years) and one 10-year age band (65–74 years) to account for the working age difference for males and females. Females in this sample were eligible to receive state pension five years earlier than the males, at age 60 years.

Scottish Index of Multiple Deprivation (SIMD) deciles were used as reporting categories for DNA percentage and EASR. The deciles were obtained by ranking the 6,505 Scottish datazones from most to least deprived, then splitting the ranked datazones into ten deciles with approximately 10% of the population in

each decile.[24] The most deprived were coded ‘1’ and the least deprived coded ‘10’. The data were stratified into the Scottish Government’s eightfold urban–rural classification[22] as described in Table 1.

Table 1: Categorisation of rurality of areas

Category	Description	Definition
1	Large urban areas	Settlements of over 125,000 people.
2	Other urban areas	Settlements of 10,000 to 125,000 people.
3	Accessible small towns	Settlements of between 3,000 and 10,000 people and within 30 minutes’ drive of a settlement of 10,000 or more.
4	Remote small towns	Settlements of between 3,000 and 10,000 people and with a drive time of over 30 minutes to a settlement of 10,000 or more.
5	Very remote small towns	Settlements of between 3,000 and 10,000 people and with a drive time of over 60 minutes to a settlement of 10,000 or more.
6	Accessible rural	Areas with a population of less than 3,000 people and within a 30-minute drive time of a settlement of 10,000 or more.
7	Remote rural	Areas with a population of less than 3,000 people, and with a drive time of over 30 minutes to a settlement of 10,000 or more.
8	Very remote rural	Areas with a population of less than 3,000 people, and with a drive time of over 60 minutes to a settlement of 10,000 or more.

Age standardisation

Both the population rate of DNAs and the percentage of new outpatient appointments that were DNAs (DNA percentage) were age-standardised to ensure that the comparisons between the population groups were not distorted by the proportions of the population in each age group. The population rate, but not the DNA percentage, was both age- and deprivation-standardised, meaning that population group DNA rate was not influenced by being younger/older or more/less deprived than other population groups.

Population DNA rates

The data were directly age-standardised by ISD to give a European age-standardised rate (EASR) using the unrevised (1976) European standard population.[25] It was not possible to calculate an EASR for the rurality and sex analyses, which were adjusted for both age and deprivation, because the standard European populations were not broken down by area deprivation using SIMD deciles. Therefore, we used the 2002/03 Scottish population as the standard to calculate an Age Standardised Rate (ASR) for deprivation deciles.

DNA percentage

The DNA percentages were age-standardised by ISD (except for the results by age group) using a reference population of the first outpatient appointment numbers for Scotland 2002/03. This allowed us to compare DNAs by age-standardised percentage (ASP) over the 10-year period.

Specialties

Specialties were selected for analysis if they were found to have a large enough number of DNAs to enable analysis (>4,000 in at least two of the previous three years).

Specialties with less than a total of 4,000 DNAs were excluded because they were likely to yield small numbers for smaller NHS Boards and area classifications (urban-rural), thereby making those estimates too imprecise for interpretation. The included specialties were dental; dermatology; ear, nose and throat; gastroenterology; general medicine; general psychiatry; general surgery; gynaecology; neurology and urology.

We use the term NHSScotland to collectively define all NHS Health Boards in Scotland.

6 Results

Background information

Almost 10% of all first outpatient appointments between 2002/03 and 2011/12 resulted in a DNA (Table 2).

Table 2: First outpatient appointment and DNA numbers and percentages for NHSScotland (2002/03–2011/12)

Total number of first outpatient appointments (2002/03–2011/12)	**17,082,422**
Total number of DNAs (2002/03–2011/12)	**1,668,114**
Crude DNA percentage (2002/03–2011/12)	**9.8%**

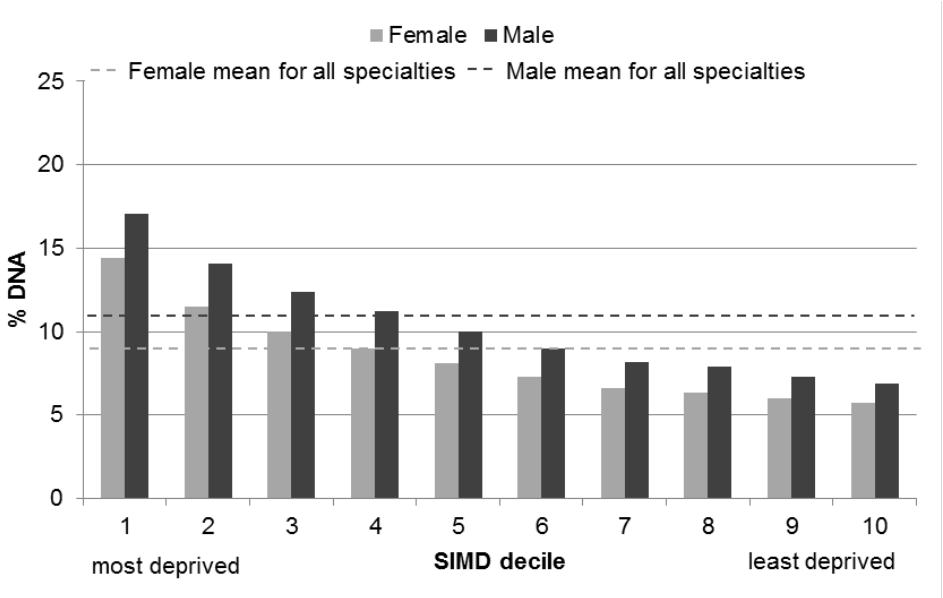
There was little change in the DNA percentage, population DNA rates or risk of DNA between 2002/03 and 2011/12. We, therefore, report only the time trends where these show a change over time.

DNA risk

SIMD and sex

The percentage risk of DNA became steadily greater in line with increasing deprivation, with the risk consistently higher for men than women in each decile (Figure 1). In the most deprived decile, 14% and 17% of appointments for females and males respectively resulted in a DNA compared to only 6% and 7% in the least deprived decile.

Figure 1: Crude percentage DNA by Scottish SIMD deciles and sex for NHSScotland (2002/03–2011/12 combined for all specialties)



There was a gradual decline in the percentage of outpatient appointments resulting in DNA over time across SIMD deciles, although the differences between deciles remained similar for men and women (Figures 2 and 3).

Figure 2: Trend in age-standardised percentage DNA by highest and lowest Scottish SIMD deciles for females in NHSScotland (2002/03–2011/12 combined for all specialties)

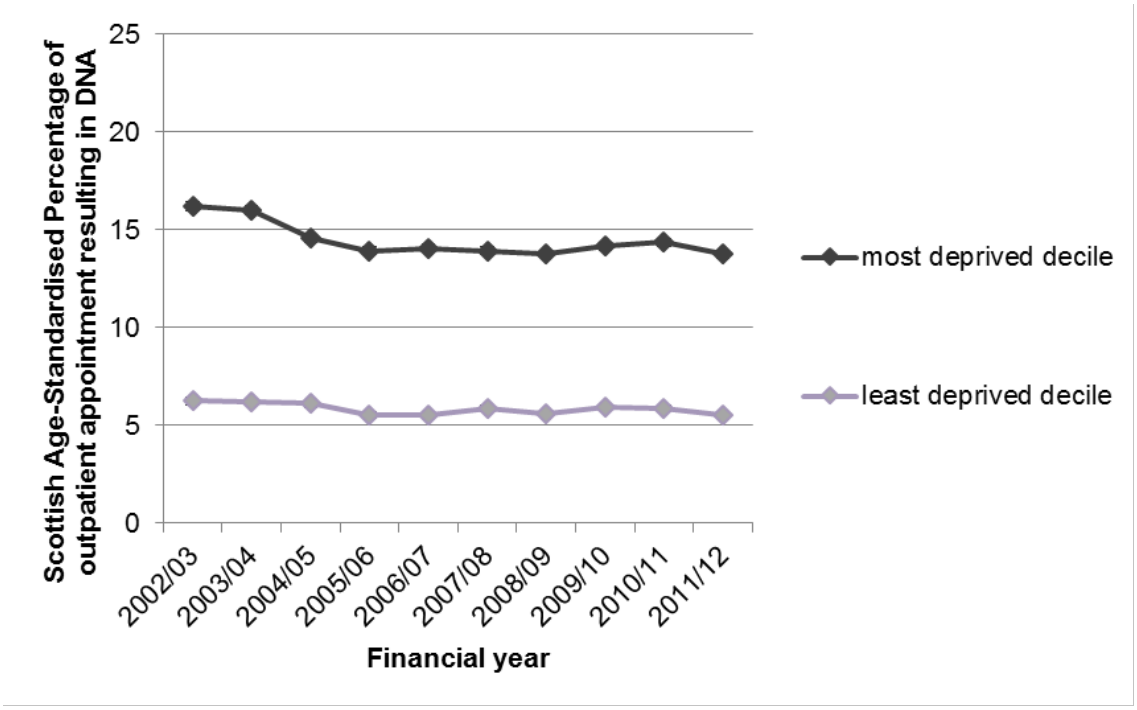


Figure 3: Trend in age-standardised percentage DNA by highest and lowest Scottish SIMD deciles for males in NHSScotland (2002/03–2011/12 combined for all specialties)

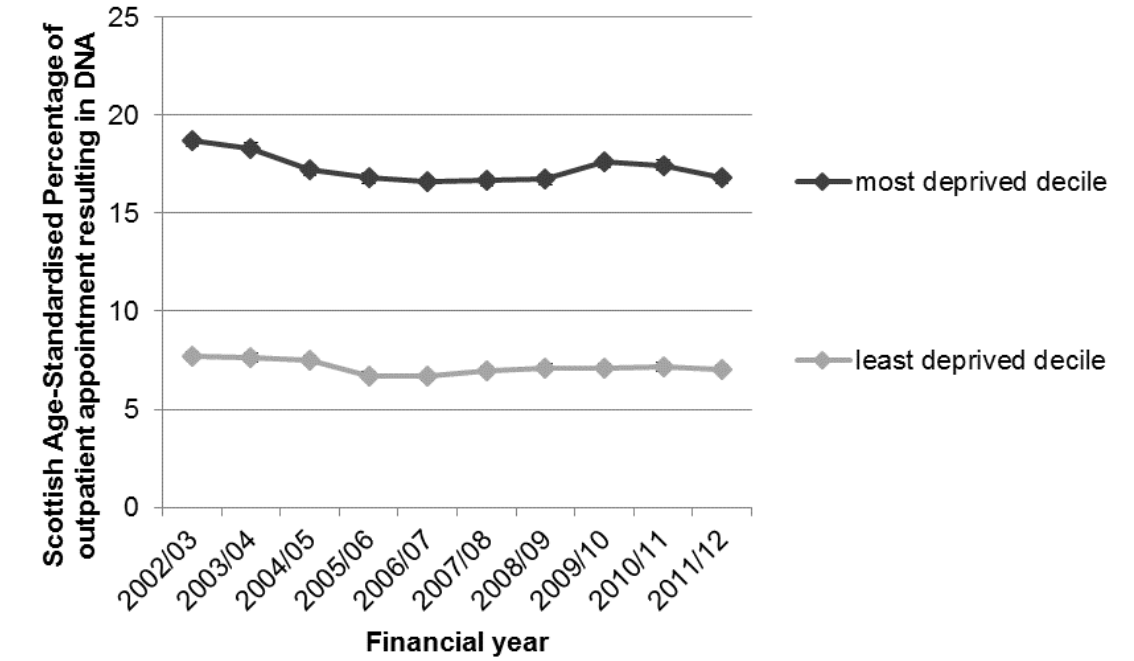


Table 3 provides the crude number of DNAs and percentages of appointments resulting in DNA by sex and SIMD decile for the year 2011/12. This shows that, although males with appointments were more at risk of DNA, females accounted for a bigger percentage of the total DNAs across all deprivation deciles.

Table 3: Crude percentage of total DNAs and age standardised percentage DNA occurring within each Scottish SIMD and sex strata for NHSScotland (2011/12 combined for all specialties)

Scottish SIMD decile	**Female**				**Male**			
	Appointments	DNAs	Age standardised % DNA	% of total DNAs	Appointments	DNAs	Age standardised % DNA	% of total DNAs
1 (most deprived)	141,734	19,267	14.0	11.0	104,253	17,107	17.0	9.9
2	126,132	13,986	11.0	8.1	89,692	12,103	14.0	7.0
3	116,625	11,427	10.0	6.6	84,201	10,092	13.0	5.9
4	110,662	9,905	9.2	5.7	80,411	8,755	12.0	5.1
5	104,132	8,382	8.2	4.9	76,197	7,535	10.0	4.4
6	98,112	6,983	7.4	4.1	73,084	6,370	9.3	3.7
7	94,991	6,038	6.7	3.5	70,687	5,444	8.3	3.2
8	92,801	5,573	6.3	3.2	67,954	5,001	8.0	2.9
9	91,289	5,282	6.1	3.1	66,778	4,570	7.3	2.7
10 (least deprived)	85,607	4,559	5.6	2.6	62,416	4,067	7.1	2.4
Total	1,062,085	91,402	8.9	53.0	775,673	81,044	11.0	47.0

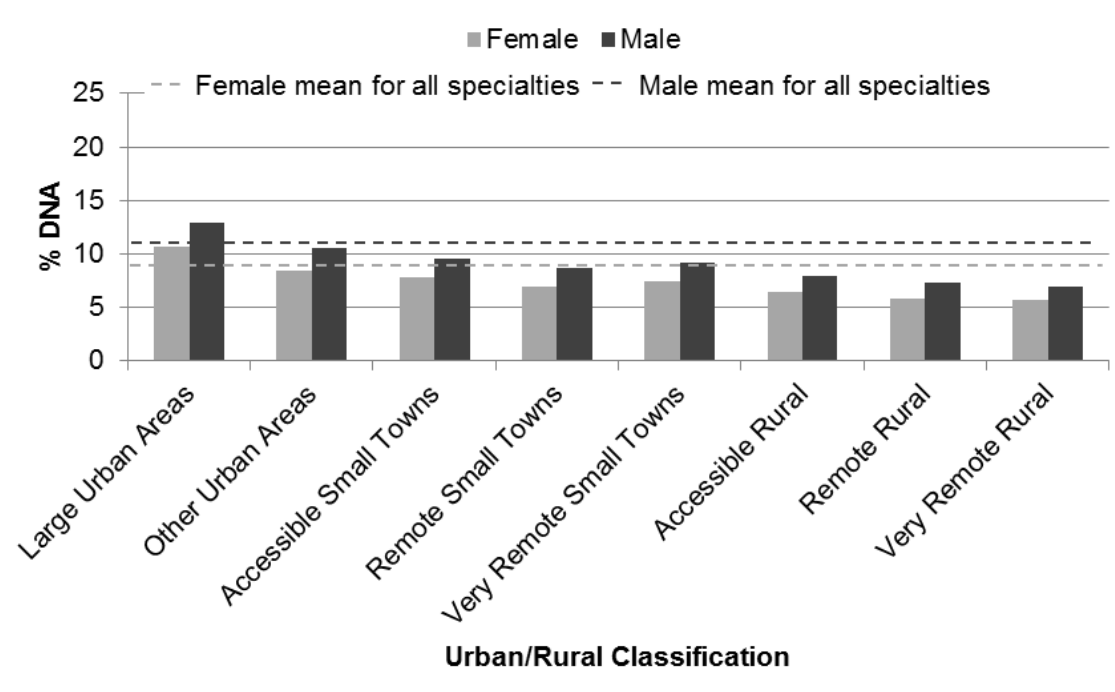
For men and women, and across all specialties, there were more appointments in the most deprived decile compared to the least deprived decile.

The percentage of appointments that became DNAs was approximately 10 percentage points higher in most deprived decile compared to least deprived; representing a risk of DNA three times higher in the most deprived group. Across all specialties, the risk of DNA was 14% for females and 17% for males in the most deprived decile, while in the least deprived these were 6% and 7%. Aggregating the deciles into quintiles[a], the two most deprived quintiles (deciles 1–4) accounted for 60% of all appointments resulting in DNAs.

Urban–rural classification and sex

Those living in urban settings accounted for the majority of all DNAs. In 2011/12 populations in large urban areas made up 49% of all DNAs and populations in other urban areas made up 30%. Figure 4 shows those living in urban settings had higher DNA percentages than those living in towns and less populated areas. The risk of DNA decreased with greater rurality and remoteness. In each urban and rural classification, males had the greatest risk of DNA.

Figure 4: Crude percentage DNA by urban–rural classification and sex for NHSScotland (2002/03–2011/12 combined for all specialties)



Females and males were at greatest risk of DNA in ‘large urban’ areas with DNA percentages of 11% and 13%. Both sexes also had a higher risk of DNA in ‘other urban’ areas (females 8.4%, males 11%) whereas those resident in remote settings were found to have a lower risk of missing appointments than those in ‘large urban’

[a] Quintiles split up the dataset into five groups, each containing 20% of the data. Deciles split up the dataset into 10 groups, each containing 10% of the data.

areas by approximately 5–6 percentage points (e.g. females and males in 'very remote rural areas' had respective DNA percentages of 6% and 7%).
As shown in Table 4, females in large urban areas had the highest percentage of all DNAs, resulting in over 5,700 more missed appointments than males in the same setting.

Table 4: Crude percentage of total DNAs and age standardised percentage DNA in urban-rural categories by sex for NHSScotland (2011/12 combined, all specialties)

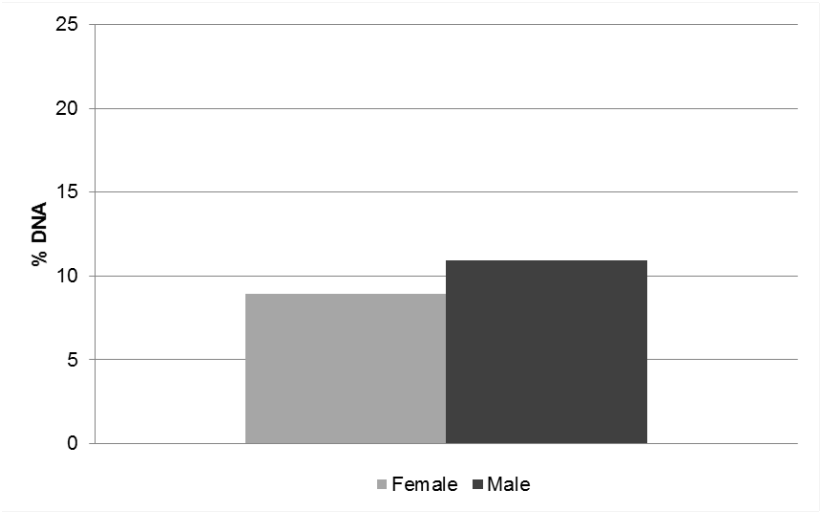
Urban-rural category	Female				Male			
	Appointments	DNAs	Age standardised % DNA	% of total DNAs	Appointments	DNAs	Age standardised % DNA	% of total DNAs
Large urban areas	447,388	44,914	10.0	26.0	318,243	39,199	13.0	22.0
Other urban areas	327,463	27,409	8.7	16.0	239,514	24,422	11.0	14.0
Accessible small towns	85,379	6,540	8.0	3.8	62,361	5,701	9.8	3.3
Remote small towns	24,405	1,606	7.0	0.9	17,309	1,428	8.8	0.8
Very remote small towns	12,717	967	7.9	0.6	9,521	888	10.0	0.5
Accessible rural	108,673	6,764	6.6	4.0	84,659	6,410	8.2	3.8
Remote rural	28,443	1,675	6.3	1.0	22,122	1,528	7.5	0.9
Very remote rural	27,621	1,527	5.8	0.9	21,946	1,468	7.3	0.9
Total	1,034,468	89,875	8.9	53.0	775,675	81,044	11.0	47.0

Sex

Females consistently accounted for over 50% of DNAs in the time period. This is related to the greater number of appointments for females than for males. However, the risk of DNA was higher in males per appointment (11% compared to 9% for females).

The crude percentage of DNAs for females was 9% over the 10-year period and was 11% for males (Figure 5). There was little change in the difference between females and males between 2002/03 and 2011/12.

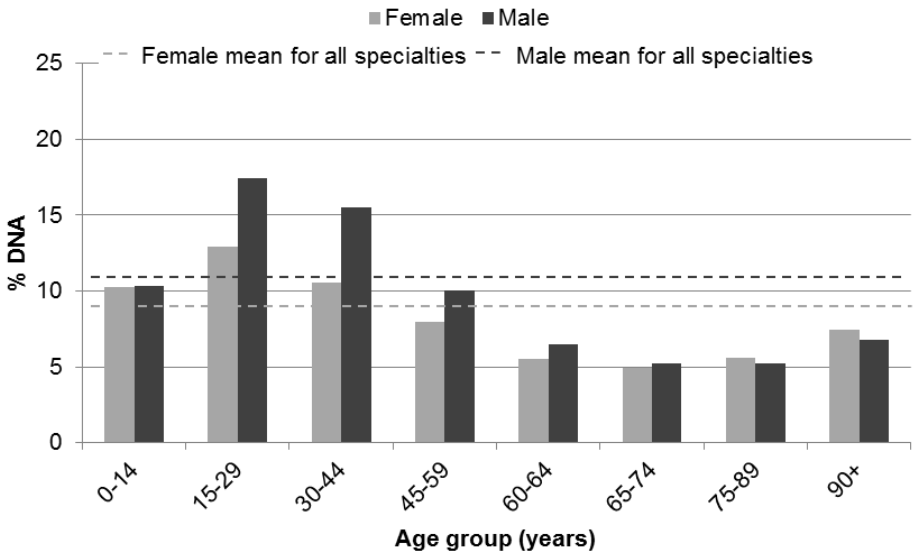
Figure 5: Crude percentage DNA for females and males for NHSScotland (2002/03–2011/12 combined for all specialties)



Age group and sex

The age groups 15–29 years and 30–44 years had the highest risk of DNAs for both sexes (Figure 6) compared to the national mean (Figure 5).

Figure 6: Crude percentage DNA by age and sex for NHSScotland (2002/03–2011/12 combined for all specialties)



For the majority of age groups, males had a higher risk of DNAs than females. This was especially seen in the 15–29 years age group (males 17%, females 13%) and 30–44 years age group (males 16%, females 11%). Both sexes shared a similar patterning of DNAs across age bands. The difference in percentage DNA between age groups remained relatively constant over the ten year period.

Given the high risk of DNAs within the young adult male population it is useful to establish how the actual number of missed appointments compares to the rest of the population. Table 5 gives a breakdown of the number of appointments, DNAs and each age group's percentage of total DNAs for 2011/12. It shows that although males were the highest DNA risk in the 15–29 years age group, females in the same age group had over 5,000 more DNAs and accounted for 14% of all DNAs in 2011/12.

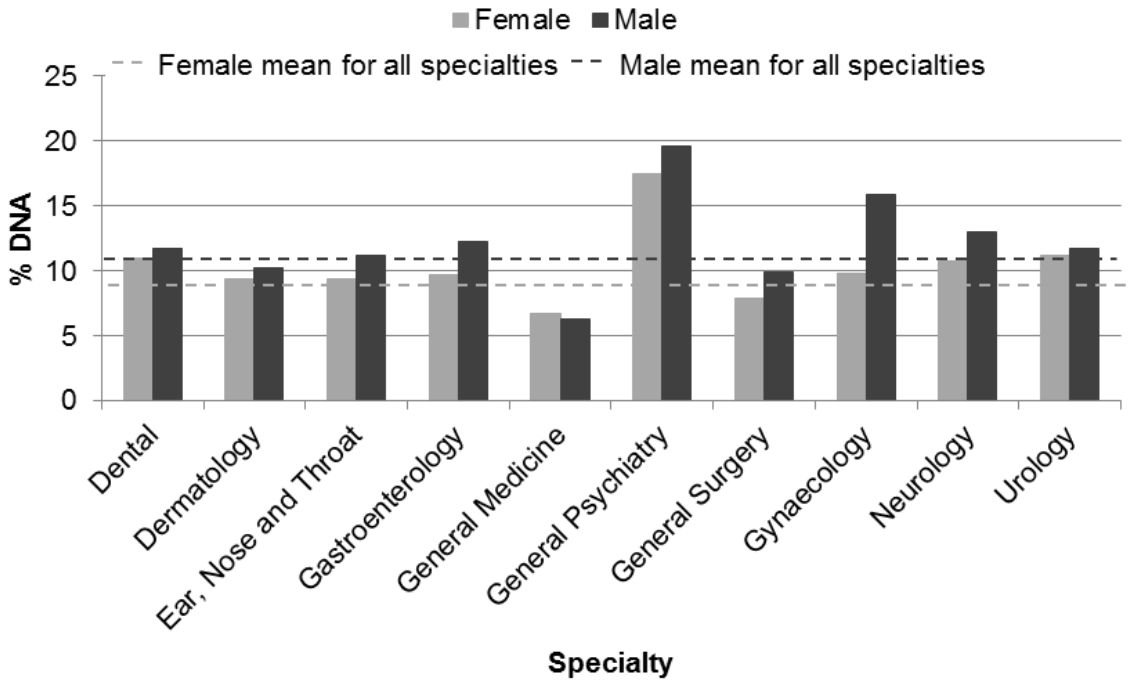
Table 5: Crude percentage of total DNAs and crude percentage DNA occurring within each age group by sex in NHSScotland (2011/12, all specialties)

Age group (years)	Female				Male			
	Appointments	DNAs	Crude % DNA	% of total DNAs	Appointments	DNAs	Crude % DNA	% of total DNAs
0–14	74,252	6,969	9.4	4.0	88,516	8,417	9.5	4.9
15–29	193,128	24,333	13.0	14.0	111,188	19,079	17.0	11.0
30–44	229,833	24,208	11.0	14.0	141,538	22,176	16.0	12.0
45–59	234,894	18,641	7.9	10.0	173,040	17,562	10.0	10.0
60–64	71,342	3,684	5.2	2.1	62,564	3,955	6.3	2.3
65–74	125,168	5,892	4.7	3.4	108,136	5,349	4.9	3.1
75–89	126,119	7,131	5.7	4.1	88,705	4,541	5.1	2.6
90+	10,110	778	7.7	0.5	4,531	280	6.2	0.2
Total	1,064,846	91,636	8.6	53.0	778,218	81,359	10.0	47.0

Specialties

Outpatient appointments in general psychiatry had the greatest risk of DNA out of all specialties considered within the ten year period (Figure 7).

Figure 7: Crude DNA percentage for selected specialties in NHSScotland (2002/03–2011/12)



Over the 10-year period, general psychiatry (females 18%; males 20%), neurology (females 11%; males 13%) and urology (females 11%; males 12%) had a crude DNA percentage greater than the mean for all specialties (females 9%; males 11%), showing a higher risk of DNA. Females with dental appointments (11%) were also at greater risk of DNA, as were men accessing gynaecology services[b] (16%). In general medicine (females 7%; males 6%), outpatients had the least risk of DNA.

Most specialties followed the trend of males being at greater risk of DNA than females, other than general medicine.

Of the selected specialties in 2011/12, ear, nose and throat had the greatest number of DNAs (Table 6) but, as shown in Figure 7, the risk of DNA was close to the mean for all specialties. Gynaecology also had a large number of DNAs. The

[b] Male attendance at gynaecology clinics may be a coding error (we were unable to verify this) but may reflect appointments by those who are considering or are in gender transition or invited to fertility clinics.

table also highlights differences between specialties. For instance, in dental services males had over 25,000 fewer appointments than dermatology, yet only 1,327 fewer DNAs.

Table 6: Crude percentage of total DNAs and age standardised percentage DNA occurring within selected specialties for each sex in NHSScotland (2011/12)[c]

Specialty	Female				Male			
	Appointments	DNAs	Age standardised % DNA	% of total DNAs	Appointments	DNAs	Age standardised % DNA	% of total DNAs
All	1,064,846	91,636	8.9	52.0	778,218	81,359	11.0	47.0
Dental	41,520	4,626	11.0	3.6	32,268	3,889	12.0	3.3
Dermatology	80,400	6,745	11.0	4.1	60,018	5,261	9.4	3.3
Ear, nose and throat	71,569	6,463	12.0	3.7	65,671	6,907	11.0	4.3
Gastroenterology	52,944	4,273	8.6	1.9	44,503	4,706	12.0	2.0
General medicine	11,921	995	9.4	0.4	7,734	572	7.2	0.2
General psychiatry	26,572	4,627	9.2	2.6	27,389	5,471	20.0	3.0
General surgery	39,091	2,788	11.0	2.3	26,860	2,299	9.5	1.9
Gynaecology	130,792	12,300	8.8	7.4	238	25	11.0	0.04
Neurology	25,870	2,790	12.0	1.3	21,185	2,779	13.0	1.3
Urology	20,536	2,291	8.4	1.1	53,301	5,999	13.0	3.5

[c] Note that there was a sharp increase in the number of appointments offered, and also in the DNAs, from around 2007/08, in psychiatry

There are differences in the patterning of appointments and DNAs by specialty and SIMD decile (Figures 8 and 9). Across the ten specialities analysed, there were 70% more appointments offered in the most deprived decile than the least deprived decile. The highest age-standardised percentage of appointments that were DNAs was found for general psychiatry (least deprived: women 12%; men 13% – most deprived: women 23%; men 25%).

Figure 8: Total attendances and DNAs for females and males in most deprived decile for selected specialties in NHSScotland (2011/12)

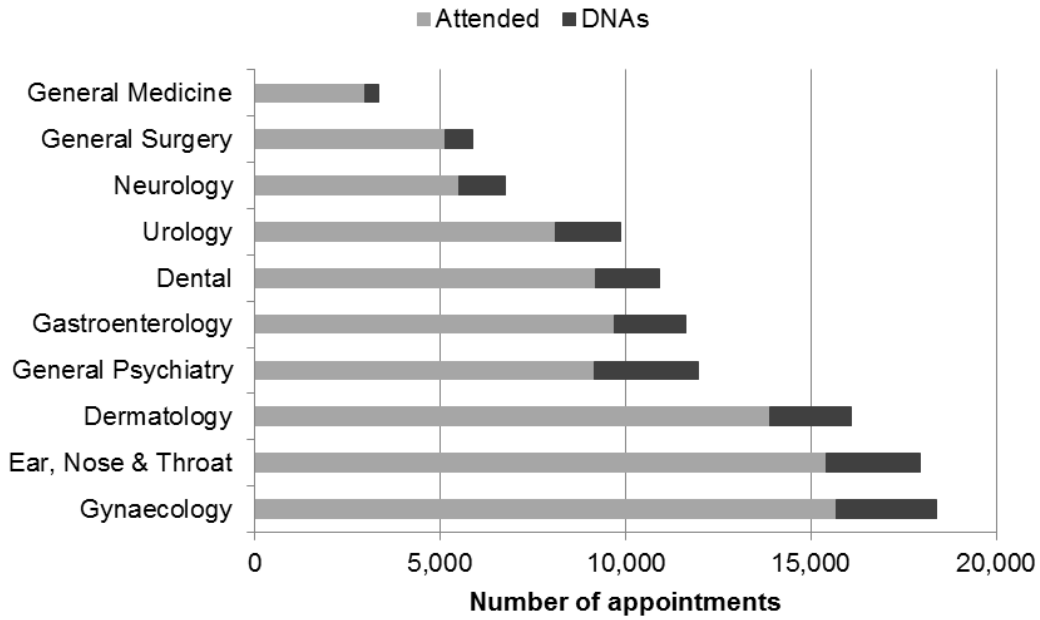
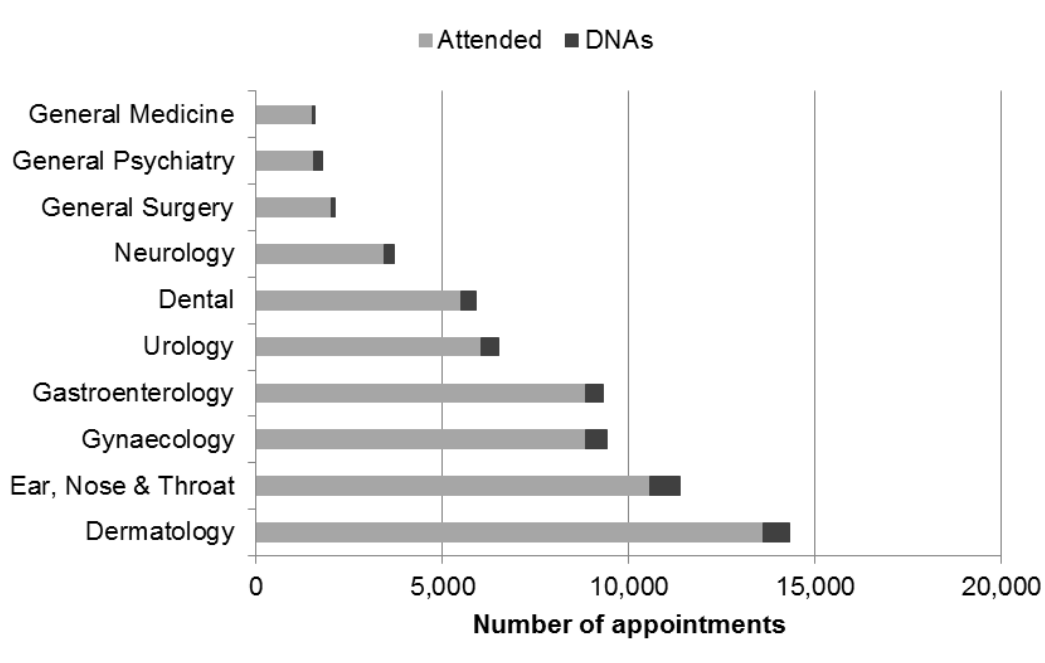


Figure 9: Total attendances and DNAs for females and males in least deprived decile for selected specialties in NHSScotland (2011/12)



General psychiatry also had the most marked social patterning in the provision of appointments, with the ratio between men in the most deprived and least deprived deciles being 8.7:1. The ratio between women in the most deprived and least deprived deciles was 5.2:1 (Table 7). The specialty with the least difference in appointments offered was dermatology (a ratio of 1.1:1) with general surgery the largest ratio other than psychiatry (at 2.8:1).

Table 7: Ratios (to a factor of 1) for number of appointments for most deprived compared to least deprived decile for selected specialties in NHSScotland (2011/12)

Specialty	Females	Males	All
Dermatology	1.2	1.1	1.1
Gastroenterology	1.2	1.3	1.2
Urology	1.9	1.4	1.5
Ear, nose and throat	1.6	1.5	1.6
Dental	1.8	2.0	1.8
Neurology	1.8	1.9	1.8
Gynaecology	2.0	n/a	2.0
General medicine	2.1	2.0	2.1
General surgery	2.8	2.7	2.8
General psychiatry	5.2	8.7	6.7
All appointments across the 10 specialties	1.7	1.7	1.7

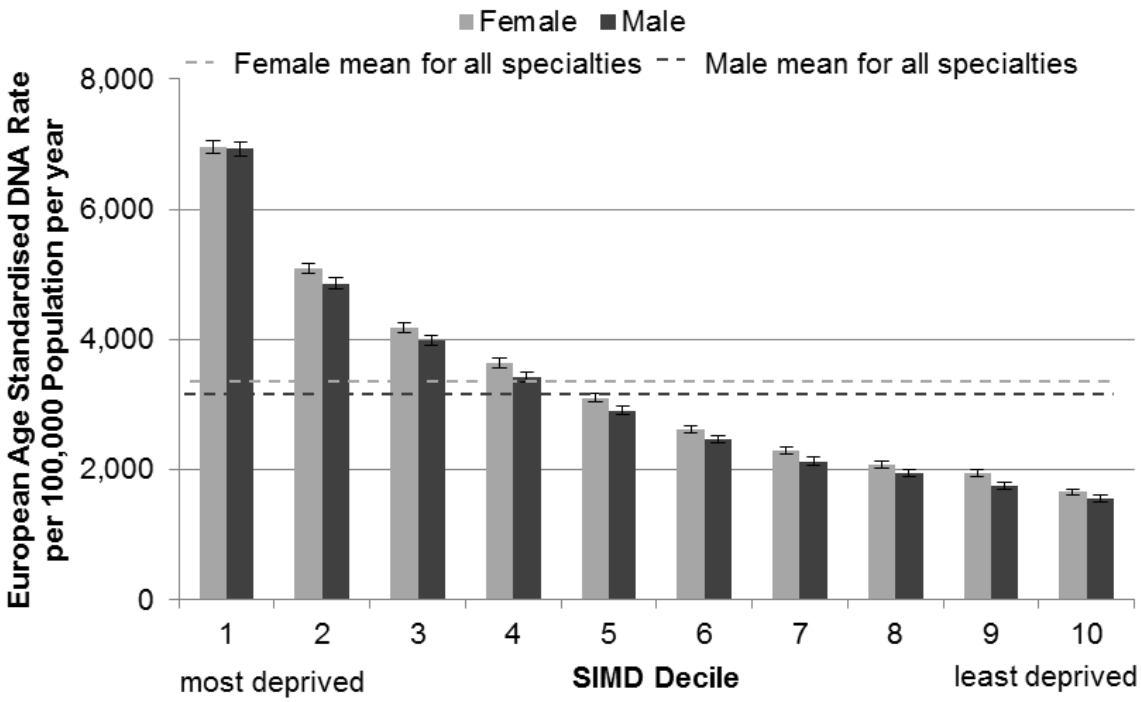
EASRs – Comparisons between crude rates and rates standardised for age and deprivation

This section reports population rates for DNA – the number of DNAs per 100,000 population per year. The DNA rates can be contrasted with the risk of DNA reported in the previous section (which is given as the percentage of appointments resulting in a DNA).

SIMD population rates

The European age standardised population rate (EASR) of DNA decreased with decreasing deprivation for females and males, as in the DNA risk, shown in Figure 1. Five thousand more DNAs per 100,000 population were observed per year for men and for women in the most deprived decile compared to the least deprived (Figure 10).

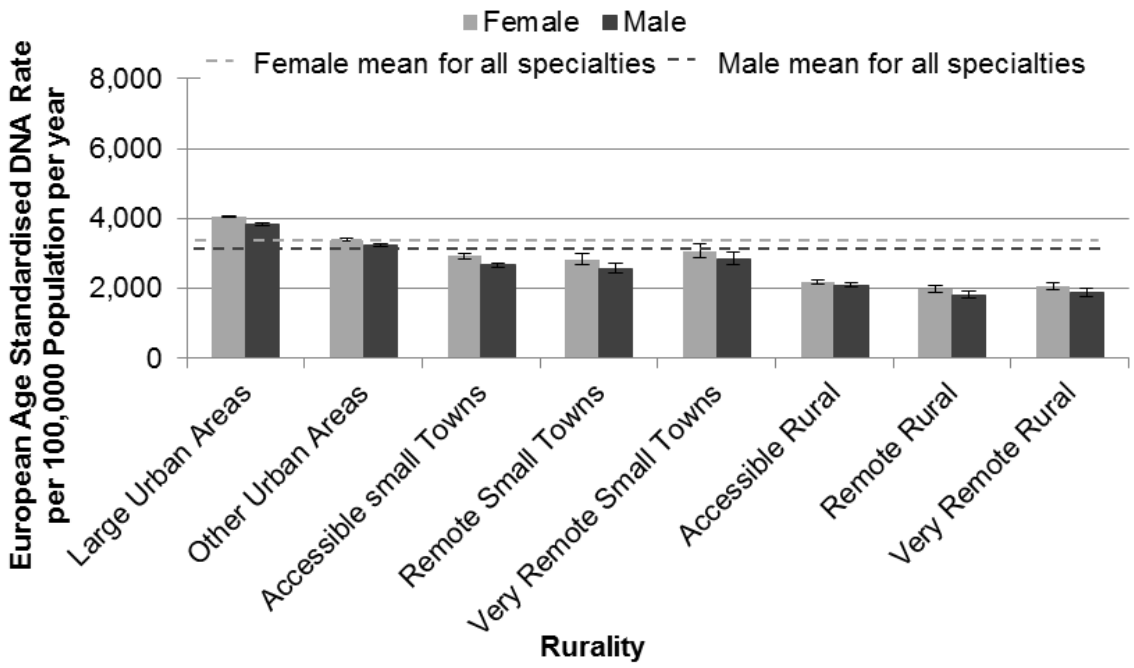
Figure 10: Age-standardised population rate for DNA for all specialties for females and males by Scottish SIMD decile, NHSScotland 2011/12



Urban–rural classification population rates

Increasing rurality and remoteness were associated with generally decreasing population rates (EASRs) of DNA (Figure 11).

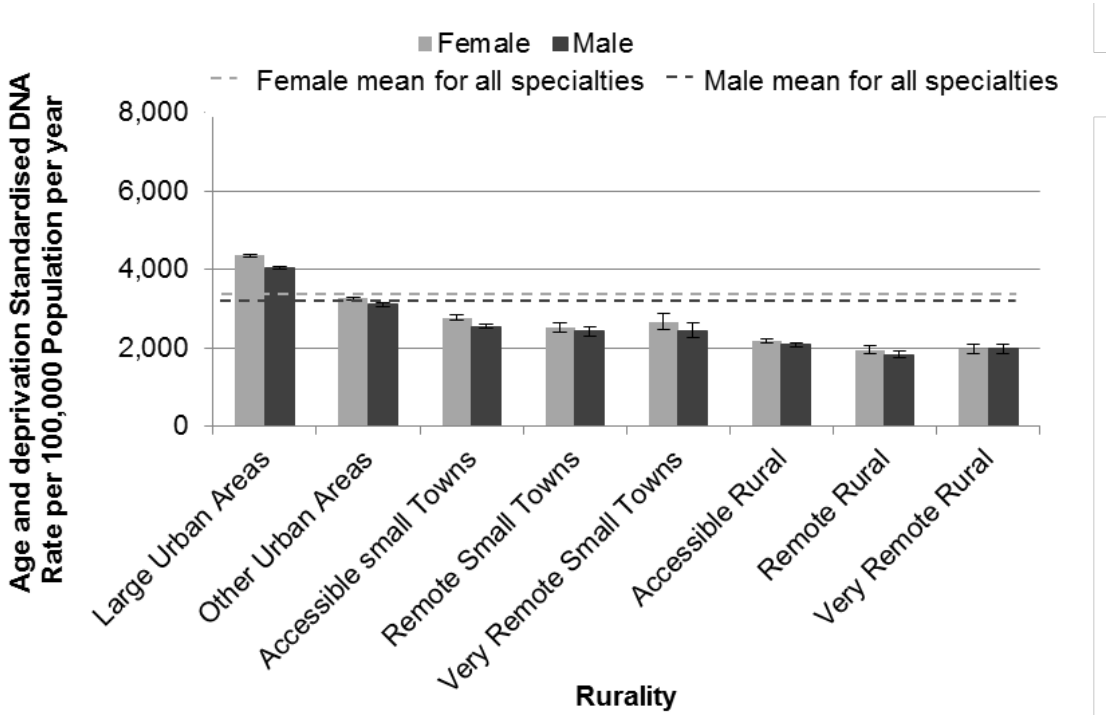
Figure 11: Age-standardised population rates for DNA for all specialties females and males by rurality, NHSScotland 2011/12



Age-standardised data show that females had a higher DNA rate than males in all urban-rural categories and both sexes had their highest DNA rates in large urban areas (4,057 and 3,833 per 100,000 per year for females and males respectively). In contrast, populations in very remote rural areas had much lower DNA rates (2,066 and 1,881 per 100,000 per year for females and males respectively).

When the data were standardised for age and deprivation, slightly higher rates were recorded in urban areas, whereas rates decreased in very remote small towns (Figure 12). We would have expected DNA rates to reduce in urban areas after adjustment for deprivation because there are higher levels of deprivation in urban than rural areas even though SIMD takes account of access deprivation. Females had a higher rate of DNAs than males across almost all urban–rural categories with age and deprivation adjusted DNA rates of 4,347 for females and 4,043 for males per 100,000 per year in large urban areas and 1,968 and 1,971 for females and males respectively in very remote rural areas.

Figure 12: Age- and deprivation-standardised population rates for all specialties for DNA for females and males by rurality, NHSScotland 2011/12



Population rates by sex

The age-standardised rate of DNAs per 100,000 per year was higher for women (3,378) than men (3,175) because the greater number of appointments for women compensated for the lower DNA percentage (Figure 13). The higher rate for women did not alter when also standardised for deprivation (Figure 14).

Figure 13: Age-standardised population rates for DNA for all specialties for females and males NHSScotland 2011/12

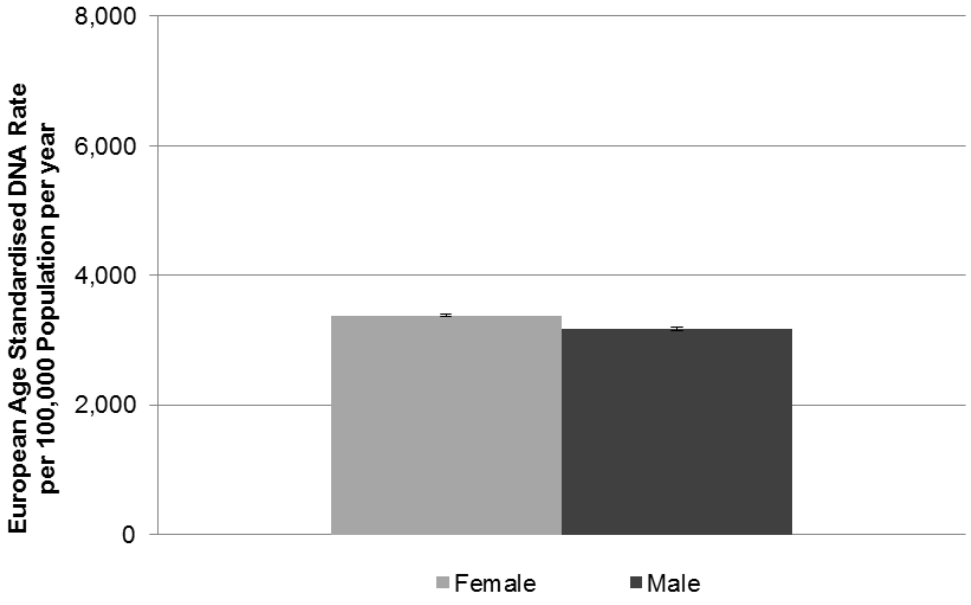
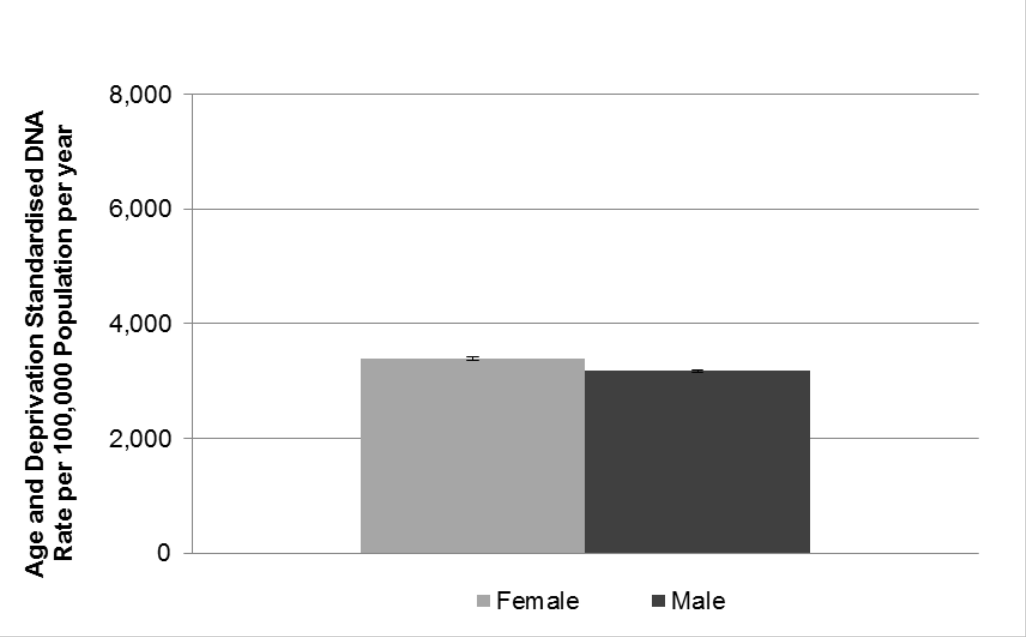


Figure 14: Age and deprivation standardised population rates for DNA for all specialties for females and males, NHSScotland 2011/12



Age population rates

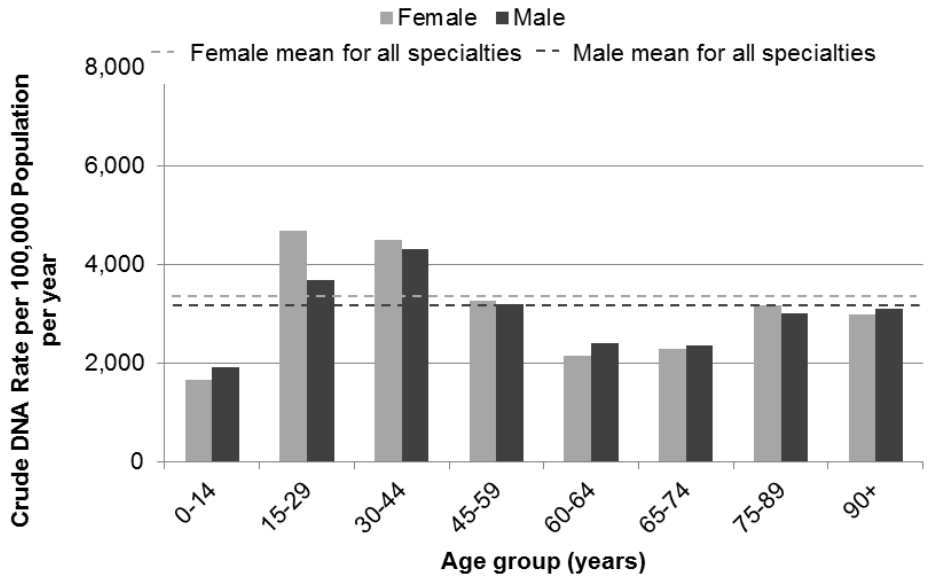
As was the case with DNA risk, those aged 15–29 years and 30–44 years were more likely to miss appointments than those aged >45 years, with EASR DNA rates of 4,680 and 4,495 for females and 3,677 and 4,306 respectively for males (Figure 15).

In contrast to DNA risk, other population rate results differed when broken down by age and sex as shown in Table 8. These results highlight the difference between calculating DNA risk by percentage of appointments and by the number of DNAs per 100,000 population.

Table 8: Differences between population rate of DNA and DNA risk (percentage of DNA) NHSScotland 2011/12

Population rate of DNA	DNA risk (percentage of DNA)
• Males and females aged 0–14 years were least likely to DNA.	• Males and females aged 65–74 years were least likely to DNA.
• Females aged 15–44 years were more likely to DNA than males of the same age.	• Males aged 15–44 years were more likely to DNA than females of the same age.
• Males aged 30–44 years were more likely to DNA than other males.	• Males aged 15–29 years were more likely to DNA than other males.

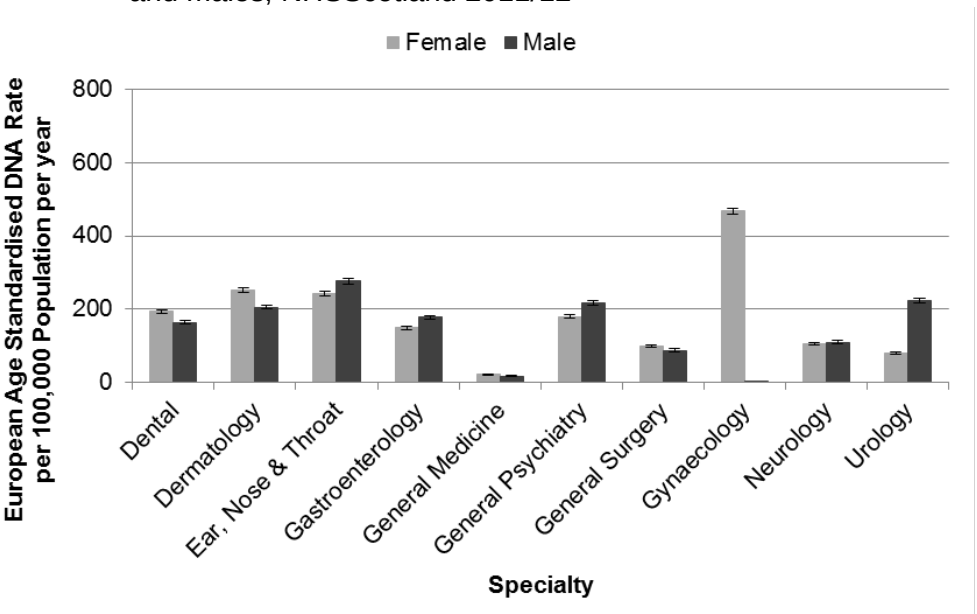
Figure 15: Crude population rates by age group and sex for DNA for all specialties for females and males, NHSScotland 2011/12



Specialties rates

The largest age standardised population rates for DNA in 2011/12 differed for males and females, as shown in Figure 16 (all per 100,000 per year). The highest female rate was for gynaecology (females 468). Rates were highest for males in ear, nose and throat (females 244, males 276). These were followed by dermatology (females 252, males 205) and urology (females 81, males 223). The rates for general psychiatry were mid-range (females 180, males 217). That contrasted with the DNA risk for general psychiatry, which was the highest risk specialty (Figure 7). The high population rate for females for gynaecology reflects their large number of appointments, and the very low rate for males reflects the low number of male appointments in this specialty.

Figure 16: Age-standardised population rates for DNA for selected specialties, females and males, NHSScotland 2011/12



7 Discussion

Main results

For those with an appointment, the DNA risk was highest among those living in more deprived areas, men, young adults, and those living in more urban settings (after accounting for deprivation). In contrast, the population rate of DNA per 100,000 per year was higher in women and middle-aged men because of the relatively greater number of outpatient appointments in those groups. So, although the highest DNA rate was among women and middle aged men, and DNAs in these groups have the greatest population impact; to reduce inequities in health care access most efficiently, the greatest improvement effort to reduce DNAs would be best focused on young adults, especially men, living in the most deprived urban areas.

Although the risk of DNA has declined, the patterning of DNAs between groups has been relatively stable for the past 10 years. In 2011–12, for all specialties, and both males and females separately, crude numbers for attendances, DNAs and total appointments showed a downward gradient across deciles from most to least deprived. The two most deprived quintiles (deciles 1–4) accounted for 60% of all appointments resulting in DNAs, which highlights that inequities in access to health care could be best improved by targeting this population group.

Outpatients in general psychiatry had the greatest risk of DNA (females 17.5%; males 19.6%) compared to the mean for all specialties (females 9%; males 11%). Neurology (females 11%; males 13%) and urology (females 11%; males 12%) were also at greater risk of DNA. The patterns by specialty differed for DNA risk and DNA rate. The greatest DNA EASRs were in gynaecology (females 468), ear nose and throat (ENT) (females 244; males 276), dermatology (females 205; males 252), and urology (females 80; males 223). Again, although the population impact of DNA is greatest for gynaecology, ENT, dermatology and urology; to reduce inequities in health care access with greatest impact for effort, improvement efforts should be focussed on the specialties with greatest risk of DNA: general psychiatry, neurology, and urology.

Across the 10 specialities analysed, there were 70% more appointments offered in the most deprived decile than the least deprived decile. This is likely to represent the interplay between the greater need in more deprived areas and differences in the demand for services and the availability and supply of services. The highest age standardised percentage of appointments that were DNAs was found for general psychiatry (least deprived: females 12%; males 13%; most deprived – females 23%; males 25%). General psychiatry also had the most marked social patterning in the provision of appointments. The ratio between appointments offered to men in

the most deprived and least deprived deciles was 8.7:1, and for women the ratio was 5.2:1. The specialty with the least difference between the most and least deprived in appointments offered was dermatology (a ratio of 1.1:1) with general surgery the largest ratio (2.8:1) second to psychiatry (6.7:1). This means that the DNAs for general psychiatry have one of the largest population impacts on inequity in access out of all the 10 selected specialties.

Strengths and weaknesses

Strengths

Our data covered all NHS outpatient appointments in Scotland over a 10-year period. These data are likely to be complete as they form part of a central registry using routine administrative data returns. When examining the risk of DNA and DNA rates by particular characteristics of the population, we were able to standardise or stratify by other potentially important confounders (we were able to standardise by age and deprivation; and also stratify by age, sex, SIMD decile and rurality).

Weaknesses

The results should be interpreted with caution because the risk of DNA and DNA rate may reflect differences in how services are provided in different areas and how this is recorded (e.g. whether services are provided via primary or secondary care). We were able to analyse the data for only a limited number of equality groups (age group and sex) because of a lack of available data by other characteristics. The SIMD includes aspects of income deprivation, rurality/remoteness and health outcomes and is, therefore, not an ideal measure of socioeconomic deprivation for our purpose. In the future, further analysis might benefit from using only the income deprivation domain of SIMD (particularly when stratifying by the rurality).

Furthermore, where a population is widely dispersed and there is a relatively greater mixing of socioeconomic groups within datazones, area-based measures such as SIMD may not be a good discriminator of populations who are more or less deprived. We did not have individual measures of deprivation available to us and we did not perform multivariate analysis to consider multiple characteristics together (e.g. SIMD, sex and age). First, and not second or third appointments were used because of quality issues with the data for the later appointments.

The circumstances of the DNA and the urgency of the treatment will affect whether the patient is referred back to their GP or put back on the waiting list, therefore, it may be that second or third appointment patterns would look different. The DNA risk for males in gynaecology relates to a small number of appointments, as can be

seen from the negligible population rate for males. Male attendance at gynaecology clinics may be a coding error (we were unable to verify this) but may reflect appointments by those who are considering or are in gender transition or invited to fertility clinics.

How our results fit with other evidence

In relation to the patterning of outpatient appointments, the SIMD profile of both appointments made and resulting in a DNA challenges earlier reporting that the socio-economic profile of the number of NHSScotland outpatient appointments is relatively 'flat'.[26] It demonstrates well the inverse care law[27] in highlighting a profile of need that does not progress throughout the system, at least at the first appointment stage. These findings provide some insight into the profile of need and the basis for targeted work to support improved equity in access to services.

Krieger suggests that differences in outcomes for equality groups could be driven by two possible classes of cause.[28] First are the equality characteristics of individuals, which can confer genetic and biological vulnerabilities and are associated with culturally determined health-related behaviours. Second, the ways society discriminates (intentionally or not) against people with those characteristics may bring about material disadvantage. Social action may correct the effects of both discrimination and any remediable biological inequalities.

In studies researching reasons for DNA, service and patient factors have been identified, though not always explicitly classified, into these two groups. Service factors include appointment timings[8 29] service location,[7] and the waiting time for the appointment.[30] Patient factors include youth and male gender,[31] addiction problems[14 32] being too ill to attend[33] and human error (forgetting).[15 34] Possible reasons for DNA can also be divided into structural factors and equality group factors. Structural factors embrace material circumstances such as poverty[33] and deprivation[15] and factors closely related to this, such as access to transport and services.[33 34] Inequality/equality group factors point to behaviours determined by group characteristics associated with differing roles, norms, resource and values in distinct population strata. These include: how services respond to different cultural understandings and language needs;[9 10] and gender-related needs and power differentials;[34] as well as in factors relating to life circumstance, such as employment status, income level and educational attainment.[35] These four factors (service, patient, equality group and structural) interact, and it is possible to envisage four potential classes of explanations for DNA:

1 **Structural patient factors:** These are the impacts of poverty and deprivation on patients which make it more likely that they will DNA.[36] This may be realised through access to the resources (both material and non-material) required to

attend (e.g. transport,[33 34] work flexibility,[37] family commitments[15] and candidacy[11 12]); and differences in the severity of illness[15 32] which may impact on the ability of individuals to attend.

2 **Equality group patient factors:** These relate to how people within particular equality groups are treated by the services and aspects of lived experience which differ between groups. Younger adults have been found to be associated with a higher risk of DNA in other countries[32] as well as the UK (e.g. a similar pattern is seen in the US).[14 38] Increasing age has been found to be associated with a lower tendency to DNA in the UK.[15] For some ethnic and religious groups, the effects of specific cultures may add barriers within the peer group around the stigma of illness.[39-42] Holding health knowledge and beliefs[43-46] that are different from those of generally accepted medical science may cause a disconnect between the solutions offered by health professionals and those deemed effective by patients.

3 **Structural service factors:** These include: the timing of appointments;[8 47] the time to wait for the appointment to start once arrived at the venue; the distance of the healthcare venue from home;[48 49] and the offer of a choice of individual health professional.[50] For public services in general, the capacity of public transport systems could affect patients' ability to attend appointments.[33] DNA may be partially due to service design, such as inconvenient timing which may especially affect certain groups (e.g. working age people and those with both work and caring responsibilities).[15]

4 **Equality group service factors:** These include discriminatory attitudes within a service (explicit or implicit) which may affect patients' willingness to both make and attend medical appointments. Discrimination by service providers is a service rather than a patient factor. The adaptation of access arrangements for equality groups falls within this category. For example, people with disabilities may require adaptations to help sensory impairment[51] and ethnic minorities may need information leaflets to be translated, and require interpreting services in consultations.[52]

This is an imperfect classification as some factors are not exclusive to one category (e.g. 'choice of individual health professional' and 'candidacy' could be both service- and patient-related). However, our four-part classification provides a framework for understanding some of the possible causes of DNA. The downward gradient we found with decreasing deprivation is a structural-patient factor, while the variation by specialty may result from factors in all four classifications.

If DNAs are to be reduced, services may need to change their procedures. Possible changes might include different appointment timing systems, greater patient choice

of health professional, and support for people with additional needs (e.g. informing patients who struggle with reading about their appointments in an alternative way). Among interventions that may reduce the rate of missed appointments, open-access scheduling has been found effective for infant well childcare visits,[29] but may suit emergency and acute problems better than chronic illnesses where patients may have to book time off work or arrange childcare. Other interventions found to be effective in reducing DNA risk include reminder systems for already booked appointments, using text messages and telephoning.[31 53] Reminders are recognised as part of patient-focused booking, which is recommended best practice in Scotland.[19] The inclusion of data on additional needs and on ethnicity by referrers is required in Scottish Government waiting times guidance.[19] This is labour-intensive for services but these data might be used to contribute further to existing understanding about the needs of more at-risk populations where a targeted approach of effective interventions to support attendance could have an impact.

Implications

More work is required to understand why DNAs occur differentially and this may help us reduce DNAs in the future. For example, more work is required to understand the differences in DNA risk for specialties, sexes, age groups and in urban and rural areas. The four-category framework above would be a way of planning further research and designing and testing further interventions. Most ethnicity and health research in the UK has concentrated on cultural and genetic differences rather than on material disadvantage.[54]

A number of existing and developing initiatives exist to support the reduction of DNAs. A number of local Health Boards are already using patient reminder systems such as the NHS 24 Patient Reminder Service,[55] as outlined by the NHSScotland Quality Improvement Hub.[56]

The Transforming Outpatient Services Programme, supported by the Scottish Government's Quality and Efficiency Support Team (QuEST), aims in 2014/15 to support NHS Boards to increase the adoption and spread of improved booking practices and use of reminder services in outpatient services. It has developed a Patient Reminder Services Change Package[18 57 58] to better enable patients to utilise appointments and to support NHS Boards to reduce the number of DNAs. The range of actions include the use of propensity tools to identify groups least likely to attend, and those specialties with high DNA volumes. The results from this report support the programme by highlighting those population groups least likely to attend first outpatient appointments, and support the identified need for targeted approaches by population group and within specialties. To support services' role in the reduction of health inequalities, it is important that actions to reduce DNAs are tailored, and undertaken with a scale and intensity proportionate to need.

Currently under development, the National Services Scotland (NSS) Discovery tool is due for completion by April 2015 and will enable NHS Boards to assess DNA rates by a number of factors, including percentage, specialty and by quarter. The Discovery Team have been engaging with Health Board nominees since May 2014, using improvement methodology to develop the tool over a six-stage cycle. Further information is available at: **www.nssdiscovery.scot.nhs.uk**

8 Conclusions

This study has shown that those living in more deprived areas, those living in urban areas (even after standardising for age and deprivation), males, young adults and those accessing general psychiatry outpatient services were at greater risk of DNAs when they had an appointment. General psychiatry also had the largest difference in number of appointments between the least and most deprived population deciles. These factors together suggest general psychiatry may be among the largest contributors to inequity in access out of the 10 specialties we studied. Women, however, had higher rates of DNA per 100,000 population per year because they had more outpatient appointments. These patterns have been relatively stable for the past 10 years. Further work to examine why these particular groups are at higher risk is required. This will include work to examine differences in the needs of these groups (e.g. different types of health problems or issues with negotiating through the health system) and differences in the services provided for them.

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