NHS Health Scotland

Who is least likely to attend? An analysis of outpatient appointment DNA data in NHS Dumfries & Galloway

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1 Summary

Aim

This project aimed to identify potential inequities in access to NHS services in NHS Dumfries and Galloway (NHS D&G) by identifying differences in the risk 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 follow up (return) appointments, were used because of quality issues with the data for the later appointments. An appointment was defined as a 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. The data were grouped by sex, age group, clinical specialty and Scottish area deprivation decile (Scottish Index of Multiple Deprivation (SIMD)).

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 and SIMD by sex.

Results

Just over 5% of all first outpatient appointments in NHS D&G between 2002/03 and 2011/12 resulted in a DNA. Patterns in DNA reflected findings at the national level, however, NHS D&G experienced lower levels of DNA risk. There was a slight decline in DNA risk 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 10% and 13% for males; within the least deprived deciles the risk for females was 2% and 3% for males.

- **age group:** for those aged 15–29 years the risk for females was 9% and 13% for males; whilst for those aged 65–74 years the risk for females and males was 2%.
- **specialty:** for all specialties the risk for females was 5% and 6% for males; whilst for general psychiatry the risk for females and males was 14%.

Although males were at higher risk of DNA, females accounted for a bigger percentage of all DNAs as they had a greater number of appointments.

The DNA risk increased with greater deprivation in both men and women.

Outpatients in general psychiatry had the greatest risk of DNA (females 14%; males 14%) compared to the mean for all specialties (females 5%; males 6%). Outpatients in neurology (females 6%; males 8%) and dental (females 6%; males 7%) were also at higher than average risk of DNA.

In general, the patterning of DNAs by deprivation, sex and age was stable from 2002/03 to 2011/12, although there was a slight decline in DNA risk over time (6.4% to 4.9%). Patterning by specialty was less stable with the exception of general psychiatry, which always had the highest risk of DNA.

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. A number of 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, males, young adults and in general psychiatry settings. The patterning of DNAs has been relatively stable for the past 10 years. Further work to examine why there is variation in the risk of DNA between groups is required, including potential differences in the barriers they face and differences in needs.

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 43,670 new (first) outpatient appointments (excluding Emergency Departments) in Dumfries and Galloway in 2011/12. Of those, 4.9% 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 healthcare. 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 health care 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 that required 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 Dumfries and Galloway by identifying differences in the risk 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 and area deprivation (using the Scottish Index of Multiple Deprivation (SIMD))[21] for all NHS outpatient appointments.

5 Methods

Data source

An appointment was defined as a 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 NHS Dumfries & Galloway (including both numerators and denominators and 95% confidence intervals calculated using Poisson distribution)[22] for all specialties and 10 selected specialties as follows:

- **a)** number and percentage of DNAs by age group (0–14 years, 15–29 years, 30–44 years, 45–59 years, 60–64 years, 65–74 years, 75–89 years, 90+ years) by sex
- **b)** number and percentage of DNAs by sex
- **c)** number and percentage of DNAs by SIMD deciles 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. The deciles were obtained by ranking the 6,505 Scottish datazones from most to least deprived, then splitting the ranked datazones into 10 deciles with approximately 10% of the population in each decile.[23] The most deprived were coded ‘1’ and the least deprived coded ‘10’.

Age standardisation

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.

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 2002/3. This allowed us to compare DNAs by age-standardised percentage (ASP) over the 10-year period.

Specialties

Specialties were selected for analysis based on NHSScotland national data 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.

Local analyses were offered to all local NHS Boards in Scotland to provide a local comparison to a national report of NHSScotland DNAs during the same period. Three reports were requested and produced.[24-26]

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

6 Results

Background information

Just over 5% of all first outpatient appointments in NHS Dumfries & Galloway between 2002/03 and 2011/12 resulted in a DNA (Table 1).

Table 1: First outpatient appointment and DNA numbers and percentages for NHS D&G (2002/03–2011/12)

Total number of first outpatient appointments (2002/03–2011/12)	413,832
Total number of DNAs (2002/03–2011/12)	21,925
Crude percentage DNA (2002/03–2011/12)	5.3%

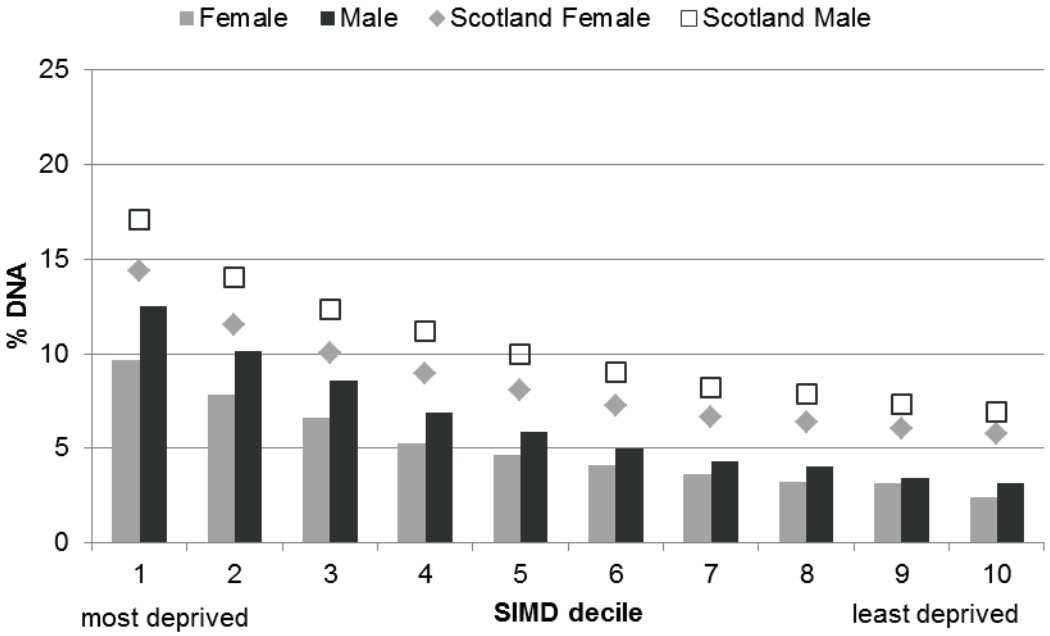
There was little change in the DNA percentage between 2002/03 and 2011/12, although there was a slight decrease from 6.4% to 4.9%. In this paper we report only the time trends where these show a change over time.

DNA risk

SIMD and sex

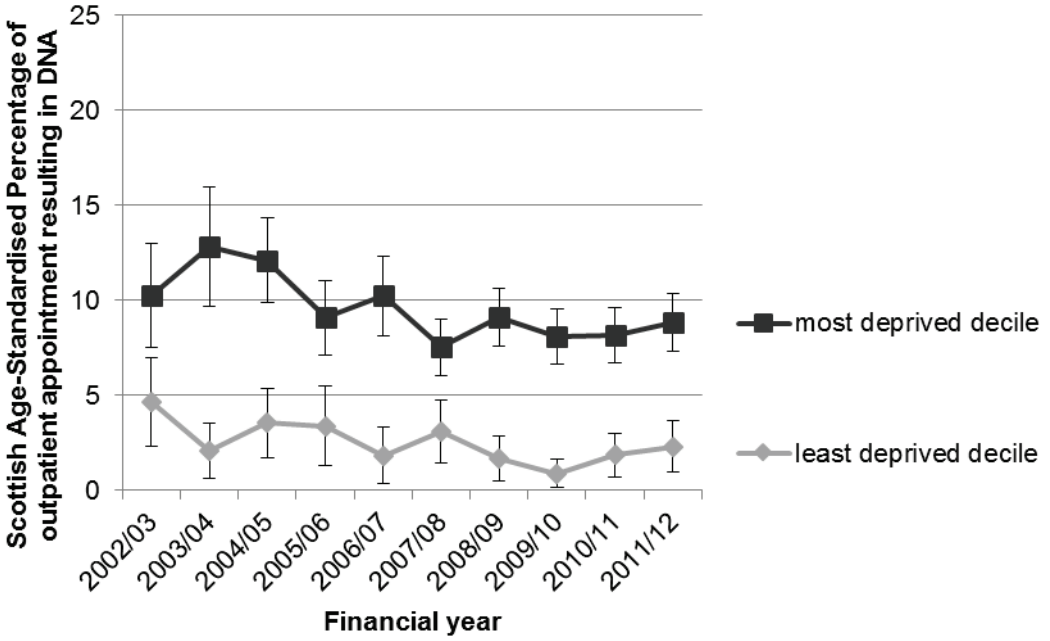
The risk of DNA was greater with increasing deprivation, with the risk higher for men than women in each decile (Figure 1). This reflected the national pattern of DNAs, however, NHS D&G had a consistently lower risk. In the most deprived decile: 10% and 13% of appointments for females and males respectively resulted in a DNA but only 2% and 3% in the least deprived decile.

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



There has been a small decline in the percentage of outpatient appointments resulting in DNA over time across SIMD deciles. The difference between deciles has remained similar for males and females from 2009–2012 (Figures 2 and 3).

Figure 2: Trend in age-adjusted percentage DNA (with 95% confidence intervals) by highest and lowest Scottish SIMD deciles for females in NHS D&G (2002/03–2011/12 combined for all specialties)[a]



[a] The prominence of confidence intervals in all relevant charts is due to the relatively small number of appointments in NHS D&G, which results in a larger margin of error.

Figure 3: Trend in age adjusted percentage DNA (with 95% confidence intervals) by highest and lowest Scottish SIMD deciles for males in NHS D&G (2002/03–2011/12 combined for all specialties)

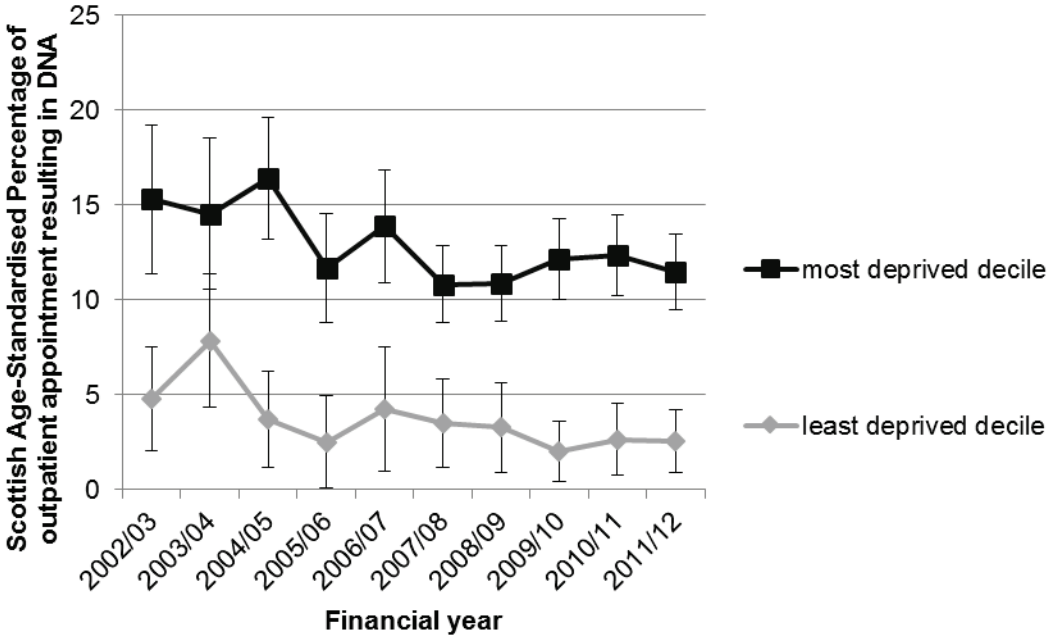


Table 2 provides the crude number of DNAs and percentages of appointments resulting in DNA by sex and SIMD decile in 2011/12. This shows that, although males with appointments were more at risk of DNA, females accounted for a bigger percentage of the total DNAs across all deprivation deciles (owing to females holding a larger proportion of overall appointments).

It also shows that although males and females in the most deprived decile were more at risk of DNA, those in SIMD decile six had the greatest number of appointments, whilst those in SIMD decile four had the greatest number of DNAs (reflecting the larger number of people living in Scottish SIMD deciles four, five and six).

The percentage of appointments that became DNAs was approximately nine percentage points higher in the most deprived decile compared to the least deprived for males. Across all specialties, the risk of DNA was 9% for females and 12% for males in the most deprived decile, while in the least deprived these were 2% and 3%. The wide variance in the crude number of appointments by SIMD decile is largely due to the small number of datazones within Dumfries and Galloway which are in some Scottish deprivation deciles.

The appointment rate for each decile is higher for females than for males. Although there was fluctuation in the trend across deciles, the rate for both males and females in the most deprived decile was highest out of all deciles. The least deprived decile did not show the lowest appointment rate, but the less deprived deciles (seven and

above) tended to have the lowest rates. There is an interesting anomaly in Dumfries and Galloway where decile 2 has a low appointment rate for both males and females.

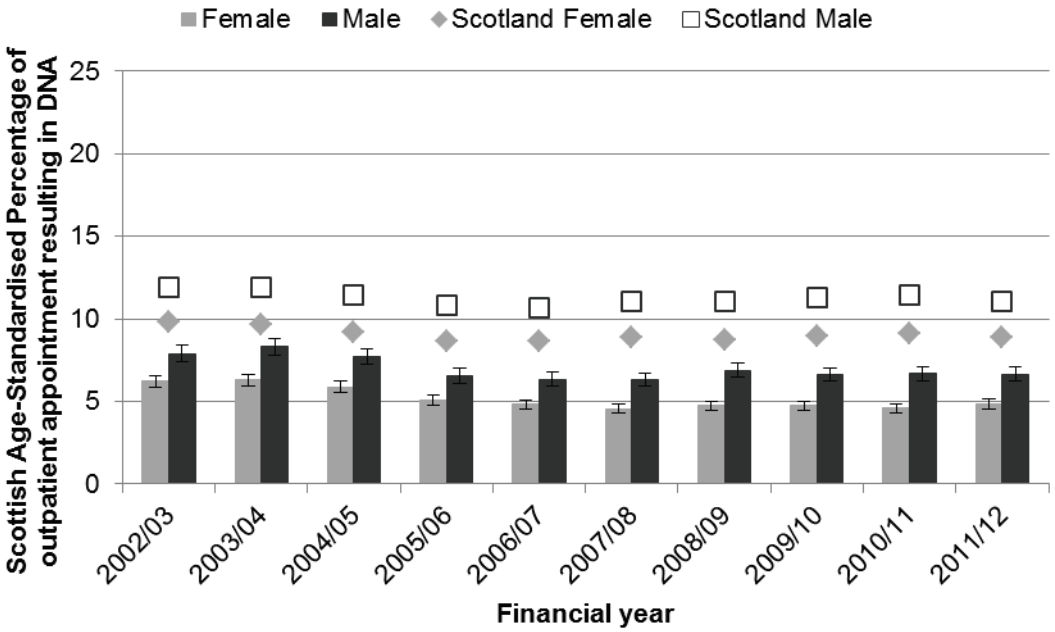
Table 2: Crude percentage of total DNAs and age-standardised percentage DNA occurring within each Scottish SIMD and sex strata for NHS D&G (2011/12 combined for all specialties)

Scottish SIMD decile	Female appointments	Female DNAs	Age-standardised % DNA (female)	Scotland age-standardised % DNA (female)	Crude appointment rate per 1,000 population (female)	% of total female DNAs	Male appointments	Male DNAs	Age-standardised % DNA (male)	Scotland age-standardised % DNA (male)	Crude appointment rate per 1,000 population (male)	% of total male DNAs
1 most deprived	1,577	140	8.8	14.0	517.0	6.6	1,180	130	12.0	17.0	439.3	6.1
2	647	48	7.5	11.0	223.3	2.3	601	57	11.0	14.0	211.8	2.7
3	2,315	134	5.9	10.0	457.3	6.3	1,633	131	8.8	13.0	360.0	6.2
4	3,878	203	5.8	9.2	334.4	9.6	2,958	209	8.4	12.0	274.6	9.8
5	4,325	165	4.3	8.2	326.4	7.8	3,298	172	6.1	10.0	259.8	8.1
6	5,192	186	4.1	7.4	322.1	8.8	3,938	176	5.4	9.3	258.0	8.3
7	3,067	97	3.6	6.7	272.5	4.6	2,331	93	4.7	8.3	213.5	4.4
8	2,163	64	3.2	6.3	243.4	3.0	1,617	47	3.3	8.0	193.1	2.2
9	1,196	39	3.4	6.1	346.1	1.8	753	11	1.2	7.3	233.7	0.5
10 least deprived	598	12	2.3	5.6	291.6	0.6	403	10	2.6	7.1	211.7	0.5
Total	24,958	1,088	4.9	8.9	321.5	51	18,712	1,036	6.7	11.0	255.6	49

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 (5% for females compared to 6% for males).

Figure 4: Trend in age-adjusted percentage DNA (with 95% confidence intervals) for females and males for Scotland and NHS D&G (2002/03–2011/12 combined for all specialties)

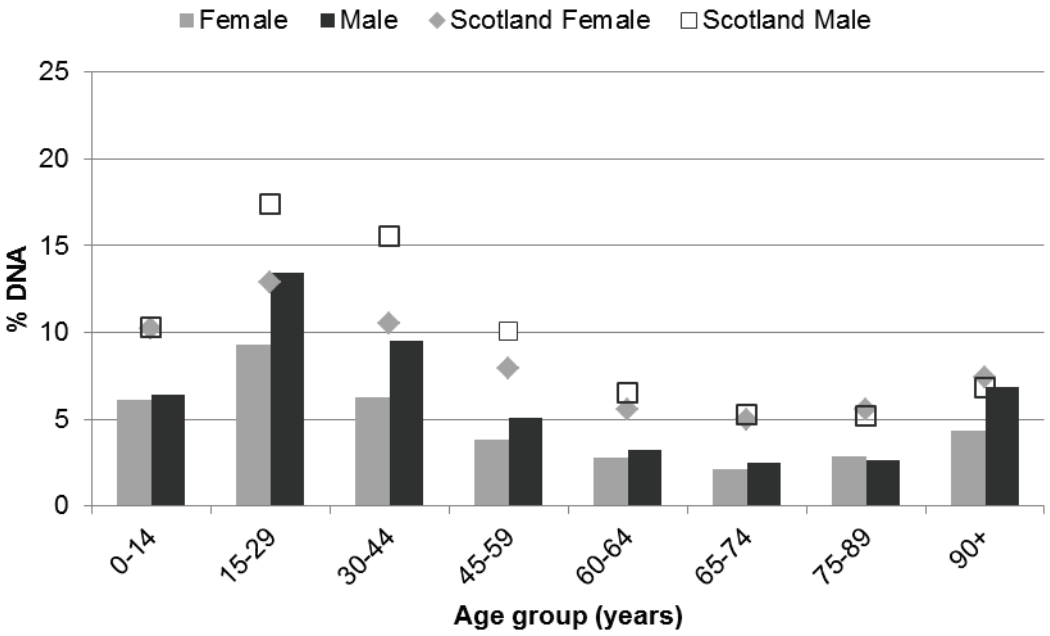


In 2011/12, the risk of DNA was 7% for males and 5% for females (Figure 4). The risk of DNA has decreased from 2002/03 (males 8%; females 6%) but has remained relatively unchanged since 2005/06. NHS D&G had a consistently lower risk of DNA than NHSScotland (males 4.4 and females 2.2 percentage points in 2011/12) with little change in the difference over the time period.

Age group and sex

The age groups 15–29 years and 30–44 years had the highest risk of DNAs for both sexes (Figure 5) compared to the local mean (females 5%; males 6%) and this matched the pattern found at the national level.

Figure 5: Crude percentage DNA by age and sex for Scotland and NHS D&G (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 so in the 15–29 years age group (males 13%; females 9%) and 30–44 years age group (males 10%; females 6%). Both sexes shared a similar patterning of DNAs across age bands. The difference in percentage DNA between age groups remained relatively constant over the 10-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 with the rest of the population. Table 3 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 had the highest DNA risk per appointment in the 15–29 years age group (Figure 5), females in the same age group had the most DNAs and accounted for 17% of all DNAs in 2011/12.

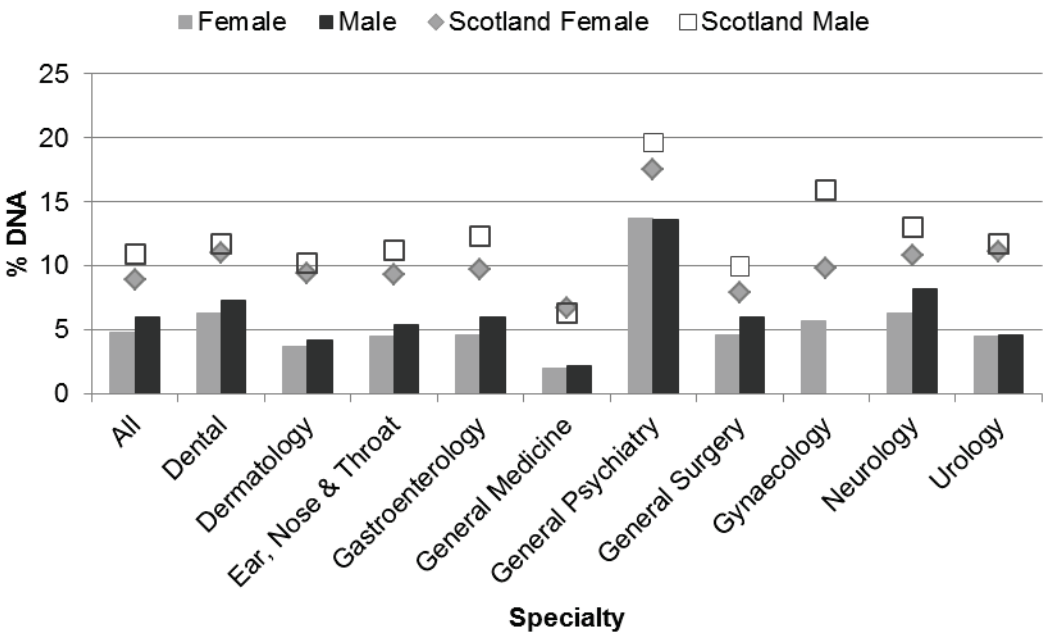
Table 3: Crude percentage of total DNAs and percentage DNA occurring within each age group for each sex for NHS D&G (2011/12 combined for all specialties)

Age group (years)	Female appointments	Female DNAs	Crude % DNA (female)	Scotland crude % DNA (female)	% of total female DNAs	Male appointments	Male DNAs	Crude % DNA (male)	Scotland crude % DNA (male)	% of total male DNAs
0–14	1,930	103	5.3	9.4	4.9	2,308	123	5.3	9.5	5.8
15–29	4,006	360	9.0	13.0	17.0	2,284	296	13.0	17.0	14.0
30–44	4,433	264	6.0	11.0	12.4	2,534	252	9.9	16.0	12.0
45–59	5,609	171	3.0	7.9	8.1	3,965	207	5.2	10.0	9.8
60–64	1,946	32	1.6	5.2	1.5	1,709	38	2.2	6.3	1.8
65–74	3,591	64	1.8	4.7	3.0	3,154	47	1.5	4.9	2.2
75–89	3,221	86	2.7	5.7	4.1	2,613	71	2.7	5.1	3.3
90+	222	8	3.6	7.7	0.4	–	–	–	6.2	–
Total	24,958	1,088	4.4	8.6	51.0	18,567	1,034	5.6	10.0	49.0

Specialties

Outpatient appointments in general psychiatry had the greatest risk of DNA out of all specialties considered within the 10-year period (Figure 6). This was also found at the national level (females 18%; males 20%), however, NHS D&G experienced lower level of DNAs. The pattern of specialties that had a higher risk of DNA than the mean for all specialties was similar to the national pattern but differed in that dermatology and urology were clearly below the local mean for all specialties.

Figure 6: Crude percentage DNA for selected specialties in NHS D&G (2002/03–2011/12)



Over the 10-year period, general psychiatry (females 14%; males 14%), neurology (females 6%; males 8%) and dental (females 6%; males 7%) had a crude DNA percentage greater than the mean for all specialties (females 5%; males 6%). Dermatology (females 4%; males 4%) and general medicine (females 2%; males 2%) outpatients were least likely to DNA.

Most specialties followed the local trend of males being more likely to DNA than females, other than gynaecology where only female data were available (national gynaecology data included DNAs by both male and female patients).

Some specialties had a particularly low number of appointments, in some cases too few to be reported. Table 4 provides a breakdown of the number of appointments, DNAs and percentage of total DNAs for 2011/12. Of the selected specialties, general surgery had the greatest number of appointments but, as shown in Figure 6, the risk of DNA was close to the mean for all specialties. The table also highlights differences between specialties. For instance, in urology males had more than three times the number of appointments than general psychiatry, yet had almost the same number of DNAs.

Table 4: Crude percentage of total DNAs and age-standardised percentage DNA occurring within selected specialties for each sex in NHS D&G (2011/12)

Specialty	Female appointments	Female DNAs	Age-standardised % DNA (female)	Scotland age-standardised % DNA (female)	% of total female DNAs	Male appointments	Male DNAs	Age-standardised % DNA (male)	Scotland age-standardised % DNA (male)	% of total male DNAs
All	24,958	1,088	4.9	8.9	51.2	18,712	1,036	6.7	11.0	48.8
Dental	1,365	73	5.8	11.0	3.4	1,158	77	8.0	12.0	3.6
Dermatology	1,103	36	3.8	8.6	1.7	895	42	7.1	9.4	2.0
Ear, nose and throat	1,506	46	3.3	9.2	2.2	1,458	53	4.2	11.0	2.5
Gastroenterology	538	16	3.2	8.8	0.8	372	13	3.5	12.0	0.6
General medicine	329	6	2.1	8.4	0.3	-	-	-	7.2	-
General psychiatry	514	72	14.0	18.0	3.4	409	61	15.0	20.0	2.9
General surgery	3,318	155	5.2	7.4	7.3	2,192	85	4.6	9.5	4.0
Gynaecology	3,091	126	5.4	9.7	5.9	-	-	-	11.0	-
Neurology	605	40	6.1	11.0	1.9	474	37	8.6	13.0	1.7
Urology	330	13	3.9	11.0	0.6	1,341	59	5.7	13.0	2.8

Unlike other reports provided[24 25 27], it was not possible to provide further analysis of the differences in the patterning of appointments and DNAs by specialty and SIMD decile due to the low number of appointments when broken down to these levels.

7 Discussion

Main results

There has been a slight decline in the risk of DNA over the 10-year period, however, it has been relatively stable from 2008 to 2012. The patterning of DNAs matched that of Scotland as a whole, however, NHS D&G experienced lower levels of DNA risk across all selected specialties. This may be reflective of the population need at the local level.

For those with an appointment, the DNA risk was highest among those living in more deprived areas, males and young adults. In 2011/12, for all specialties, those in SIMD deciles 4, 5 and 6 (reflective of the population distribution within Dumfries and Galloway across Scottish deprivation deciles), females and those aged 15–59 years had the greatest number of appointments and DNAs. So, although the greatest number of DNAs occurred in these groups; to reduce inequities in healthcare access most efficiently, the greatest improvement effort to reduce DNAs would be best focused on young adults, especially men, living in the most deprived areas.

Outpatients in general psychiatry had the greatest risk of DNA (females 14%; males 14%) compared to the mean for all specialties (females 5%; males 6%). Those with neurology (females 6%; males 8%) and dental (females 6%; males 7%) appointments were also at greater risk of DNA.

Strengths and weaknesses

Strengths

Our data covered all NHS outpatient appointments in NHS Dumfries & Galloway 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 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 also stratify by age, sex and SIMD decile).

Weaknesses

The results should be interpreted with caution because the risk of DNA 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 or Board-specific deciles. Furthermore, where a population is widely dispersed and there is relatively greater mixing of socioeconomic groups within datazones (as is the case in Dumfries and Galloway), area-based measures of deprivation such as SIMD may not be a good discriminator of populations who are more and 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 follow up (return) 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.

How our results fit with other evidence

Population groups at higher risk of DNA in NHS Dumfries & Galloway were similar to those across NHSScotland, as reported in our national report.[27]

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'.[28] It demonstrates well the inverse care law[29] 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.[30] 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 31] service location[7] and the waiting time for the appointment.[32] Patient factors include youth and male gender,[33] addiction problems,[14 34] being too ill to attend[35] and human error (forgetting).[15 36] Possible reasons for DNA can also be divided into structural factors and equality group factors. Structural factors embrace material circumstances such as poverty[35] and deprivation[15] and factors closely

related to this, such as access to transport and services.[35 36] 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,[36] as well as in factors relating to life circumstance such as employment status, income level and educational attainment.[37] 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.[38] This may be realised through access to the resources (both material and non-material) required to attend (e.g. transport,[35 36] work flexibility,[39] family commitments[15] and candidacy);[11 12] and differences in the severity of illness,[15 34] 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[34] as well as the UK, (e.g. a similar pattern is seen in the US).[14 40] 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.[41-44] Holding health knowledge and beliefs[45-48] 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 49] the time to wait for the appointment to start once arrived at the venue; the distance of the healthcare venue from home;[50 51] and the offer of a choice of individual health professional.[52] For public services in general the capacity of public transport systems could affect patients' ability to attend appointments.[35] DNAs may be partially due to service design, such as inconvenient timing which may especially affect certain groups such as 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,[53] and ethnic

minorities may need information leaflets to be translated and require interpreting services in consultations.[54]

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 likely to be due to structural-patient factors, 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,[31] 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.[33 55] 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 we put forward 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.[56]

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,[57] as outlined by the NHSScotland Quality Improvement Hub.[58]

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 59 60] to better enable patients to utilise appointments and to support NHS Boards to reduce the number of DNAs. The range of actions includes 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, males, young adults and those accessing general psychiatry outpatient services were at greater risk of DNAs when they had an appointment. 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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