Primary care encounters for foot and ankle problems in children and young people

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ABSTRACT

Background: There is little data describing the nature and frequency of foot and ankle problems in children and young people (CYP) problems attending primary care.

Aim: To describe the epidemiology, presentation and healthcare use for foot and ankle problems in CYP across England.

Design and Setting: Population-based cohort study using the UK Clinical Practice Research Datalink (CPRD) Aurum (January 2015 to December 2021).

Method: Data from the CPRD was accessed for those aged 0–18 years presenting to their General Practitioner (GP) (from January 2015 and December 2021) with a foot or ankle problem and consultation rates calculated. Rates were used to estimate the expected number of foot and ankle consultations among CYP in an average practice. Hierarchical Poisson regression models estimated the relative rate of foot and ankle consultations and logistic regression analysis evaluated sociodemographic associations and pre-existing health conditions with repeat attendance.

Results: There were 416,137 patients with 687,753 encounters for foot and ankle health. Rates peaked at 601 consultations per 10,000 patient years among males aged 10-14 years in 2018. The most observed encounters were “ingrowing toenail” (16%) and “foot pain” (10%). The highest frequency code categories for encounters were “musculoskeletal” (34%), and “unspecified pain” (21%). An average general practice with 3,500 CYP patients might observe 132 (110 - 155) foot and ankle consultations per year. Odds for repeat visits were lower among females compared to males (OR 0.95, 95% CI:0.93–0.96) and higher among those with pre-existing health conditions including juvenile arthritis (OR 1.73, 95%CI:1.48–2.03).

Conclusion: GP encounters for foot or ankle problems appear high and indicate the need for rapid access to appropriate health professionals for accurate diagnosis & treatment. Relatively higher rates of consultations among those aged 10 to 14 years and the increased likelihood of repeat visits among those with existing health conditions have implications for service provision.

Keywords: foot; ankle; general practice; paediatric epidemiology; CPRD

How this fits in: There is little data describing the nature and frequency of foot and ankle problems in children and young people (CYP). These problems can impact on mood, self-confidence, and social interactions. Ensuring that foot and ankle problems are managed through appropriate services is essential to keep children active. We sought to describe the epidemiology, presentation and healthcare use in CYP aged up to 18 years who present to their GP. CYP are most frequently attending primary care for musculoskeletal issues and unspecified pain. The data suggests that there is a need for rapid access to the appropriate health professional(s) for accurate diagnosis & treatment. Relatively higher rates of consultations among CYP aged 10 to 14 years and the increased likelihood of repeat visits among those with pre-existing health conditions have implications for service provision.

INTRODUCTION

Foot and ankle problems are thought to be prevalent among children and young people and can impact on mood, self-confidence, and social interactions [1-3]. Foot and ankle problems have been reported to impact on school attendance and engagement, self-consciousness, and participation in life-events alongside their peers [4, 5]. These can also be a matter of distress for parents [6]. Maintaining good foot health throughout childhood is crucial for healthy development [7], to keep fit and active and for longer-term health and wellbeing.

Foot and ankle problems have been shown to persist beyond one year in 27% [2] to 32% of children [8] and the effective management of these can be challenging; this is particularly important for children with pre-existing medical problems and disabilities where health needs are often higher [9, 10]. Timely access to the appropriate health professional(s) is key to early detection, management and reduction in adverse outcomes [11], such as long-term disability and chronic pain [3]. Despite this, children's foot and ankle problems are poorly understood [12] and there is very little data describing the nature and frequency of foot and ankle problems in those attending primary care. This research aimed to use national, primary care data to describe he epidemiology, presentation, and healthcare use for foot and ankle problems in CYP.

METHODS

Study Population & Data Sources

The data source for this study was the UK Clinical Practice Research Datalink (CPRD) Aurum, a primary care database of anonymised electronic health records for general practices in the UK. The CPRD Aurum includes comprehensive medical record data, including coded recording of prescriptions and clinical diagnoses from general practice, in addition to referrals to and discharge letters from secondary care. There are a total of 1,491 contributing general practices in England with approximately 41 million currently registered patients in the May 2022 release [13]. The database includes data for all registered patients

at participating general practices, except for a negligible number of patients who opt out of data collection. There were 7,612,087 (52%) CYP from all English practices in the May 2022 release. Each patient has a unique anonymised numerical identifier that remains the same at each update of the database. Patients may therefore be tracked through successive releases of the database which is updated monthly. CPRD Aurum is considered to be representative of the general population in terms of geographical distribution, deprivation, age, and gender [14]. Linked socioeconomic data from the Index of Multiple Deprivation (IMD) for patient postcode and practice postcode, and secondary care data from Hospital Episode Statistics (HES), were provided for this study by CPRD. Approximately 75% of CPRD practices in England are eligible for linkage. Here we use HES ethnicity data for study participants with ethnicity data missing in the CPRD, as HES has a higher completeness of recording for this variable. The protocol was approved by the CPRD Independent Scientific Advisory Committee (ISAC protocol 20_ 002137).

We extracted data for all CYP up to the age of 18 years with a consultation for a foot and ankle problem during the period 1st January 2015 to 31st December 2021 in the May 2022 release of CPRD Aurum. We excluded patients from practices in Northern Ireland, Scotland, or unknown regions (also excluded from the CPRD denominator file for rate calculations).

Main measures

The cohort was selected based on any recorded foot and ankle health diagnoses (with a maximum age of 18 years at index date) recorded in the study period (S1 Table). These were grouped into categories which were derived from existing work using CPRD data [12]: musculoskeletal, nerve, dermatological, circulatory issues, infection, surgical procedures, tumour, fracture, miscellaneous and unspecified pain. Covariates were defined using data recorded in the study period before the index date. Covariates were selected because of known associations with foot and ankle health issues and included ethnicity (classified as "white," "black," "Asian", "mixed," "other," and "not known"), IMD for practice and patient, age

category (0 to 4 years, 5 to 9 years, 10 to 14 years, 15 to 18 years), gender (male or female) (covariate and category terminology as specified by CPRD [15]), region of practice, pre-existing health conditions (autism, lupus, juvenile arthritis, intellectual disability, diabetes, cerebral palsy and attention-deficit hyperactivity disorder) and body mass index (BMI). The BMI values were converted to Z-scores and adjusted for age and gender using the British 1990 growth reference data population [16]. Normal weight was defined as a BMI Z-score <1.04 (<85th percentile on a growth chart). Overweight was defined as 1.04 to 1.64 (85th to 95th percentile) and obese as a Z-score of ≥1.64 (≥95th percentile) of the UK 1990 reference population [16]. Social deprivation data was derived from participant postal code of residence and practice postal code based on IMD 2019 classification at lower super output area, divided into quintiles based on the national distribution from first quintile (most deprived) to fifth quintile (least deprived) [17]. The IMD is derived from seven domains of deprivation (income; employment; education; health; crime; housing; quality of living environment).

Analysis

We calculated age- and gender-specific rates of foot and ankle consultations per 10,000 patient–years. Adjusted and unadjusted hierarchical Poisson regression models with patient-years as offset and practice identifier as a random effects variable were fitted to estimate the relative rate of foot and ankle consultations according to gender (with males as the reference group), age group (with those aged 10 to 14 years as the reference group), year of diagnosis (with 2015 as the reference group) and region (with South East as reference). Hierarchical multivariable logistic regression analysis using binomial distribution and a logit link function evaluated sociodemographic associations and existing health conditions with repeat attendance for foot and ankle health issues within 6 months during the study period. Included in the model were gender, age category, ethnic group, practice IMD and comorbidity presence as a binary variable and with practice identifier as a random effects variable. Subgroup analyses evaluated sociodemographic associations and existing health

conditions with repeat attendance for foot and ankle health issues within six months of the index visit for categories of codes musculoskeletal, dermatological, unspecified pain and infection. We calculated the number of events expected (and their 95 CIs) among CYP in a general practice with 10,000 patients (the general practice mean list size for England) during the study period, but excluding 2020 and 2021 due to the Covid-19 pandemic. We used the average consultation rates calculated for our study population during 2015 to 2019 to estimate the expected number of consultations for all foot and ankle health events, for subcategories of foot and health diagnoses and for the top ten individual diagnoses among numbers of CYP for this average practice. Analyses were performed using R version 4.2.3 [18]. The “stats” package [19] was used for analysis, and “ggplot2” [20] and “forestplot” [21] were used to construct plots.

RESULTS

Characteristics of study population

There were 416,137 patients with 687,753 encounters for foot and ankle problems from 1st January 2015 to 31st December 2021 from 1,448 practices. Descriptive characteristics for the cohort and their total number of encounters are presented in Table 1. The mean age of the study population was 10.7 years (standard deviation, 4.6) and the age category with the highest frequency of first (42%) and total (44%) foot and ankle health encounters were 10 to 14 years. There were more males (52%) than females (48%) in the cohort and across all the age categories apart from category 5 to 9 years where 70,090 (53%) were females compared to 62,087 (47%) males. Most participants had only one encounter for foot and ankle during the study period (67%). Participants were mostly in the white ethnic group (77%), followed by Asian (7%), Black (4%) and “Other” (4%). Practices were mostly in the least deprived quintile of deprivation (18%) according to their postcode IMD and were mostly situated in the South East region of England (21%), followed by the North West (19%) and South West (17%). According to patient-level IMD, most CYP were in the most (21%) and

least deprived (21%) quintiles. The most frequently recorded pre-existing health conditions were autism (4%) and ADHD (4%), although those with intellectual disability had the highest proportion of total encounters (5%). Most participants did not have a BMI (z) recording in the years pre and post their index date or were below the age of 3 during this recording (90%). Whilst the BMI (z) was unknown for most of the total encounters (42%), there were more BMI (z) records overall, indicating that over a third of consultations were with patients with a normal BMI (z), 13% overweight and 11% obese.

Table 1: Cohort characteristics and outcome frequencies. Figures are frequencies (column percent) except where indicated.

		Patients	Consultations
Total		416,137 (100)	687,753 (100)
No. encounters			
	One	278,443 (67)	-
	Two	78,883 (19)	-
	Three to five	49,345 (12)	-
	Six to ten	8,156 (2)	-
	More than ten	1,310 (0)	-
Foot and ankle problem*			
	Musculoskeletal	153,701 (37)	236,880 (34)
	Unspecified pain	93,596 (22)	148,137 (22)
	Dermatological	72,344 (17)	143,575 (21)
	Infection	45,878 (11)	76,315 (11)
	Fracture	31,755 (8)	52,484 (8)
	Miscellaneous	17,088 (4)	25,879 (4)
	Surgical procedure	1,494 (0)	3,956 (1)
	Nerve	224 (0)	436 (0)
	Tumour	36 (0)	59 (0)
	Circulatory issue	21 (0)	32 (0)
Age group (years)			
	0 to 4	54,260 (13)	72,787 (11)
	5 to 9	92,802 (22)	132,177 (19)
	10 to 14	173,823 (42)	300,272 (44)
	15 to 18	95,252 (23)	182,517 (27)
Gender			
	Male	218,065 (52)	361,639 (53)
	Female	198,072 (48)	326,114 (47)

		Patients	Consultations
Body mass index (z)**			
	Normal weight	27,652 (7)	235,535 (34)
	Overweight	9,036 (2)	85,970 (13)
	Obese	6,717 (2)	74,039 (11)
	Unknown	372,732 (90)	292,209 (42)
Ethnic group			
	White	319,115 (77)	540,159 (53)
	Asian	29,231 (7)	44,779 (7)
	Black	17,522 (4)	26,589 (4)
	Mixed	14,543 (3)	22,390 (3)
	Other	14,965 (4)	22,539 (3)
	Not known	20,761 (5)	31,297 (5)
IMD (practice)			
	First quintile (most deprived)	73,027 (18)	119,895 (17)
	Second quintile	70,079 (17)	117,308 (17)
	Third quintile	85,164 (20)	143,441 (21)
	Fourth quintile	88,136 (21)	145,194 (21)
	Fifth quintile (least deprived)	99,731 (24)	161,915 (24)
IMD (patient)			
	First quintile (most deprived)	87,557 (21)	146,951 (21)
	Second quintile	79,024 (19)	131,047 (19)
	Third quintile	75,054 (18)	126,060 (18)
	Fourth quintile	79,410 (19)	129,229 (19)
	Fifth quintile (least deprived)	88,238 (21)	143,988 (21)
	Unknown	6,854 (2)	10,478 (2)
Region			
	South East	89,307 (21)	146,230 (21)
	North West	80,234 (19)	133,886 (19)
	South West	71,161 (17)	92,956 (14)
	West Midlands	68,077 (16)	114,247 (17)
	London	54,243 (13)	107,314 (16)
	East of England	20,574 (5)	33,820 (5)
	East Midlands	7,033 (2)	12,078 (2)
	North East	14,561 (3)	23,918 (3)
	Yorkshire & The Humber	12,982 (3)	23,304 (3)
Health conditions			
	Lupus	100 (0)	169 (0)
	Juvenile arthritis	766 (0)	1,607 (0)
	Intellectual disability	7,827 (2)	14,427 (5)

	Patients	Consultations
Diabetes	6,536 (2)	11,719 (2)
Autism	14,870 (4)	27,186 (4)
Cerebral Palsy	1,261 (0)	2,485 (0)
ADHD	11,260 (3)	20,084 (3)

*This is the category of diagnosis for the first encounter per patient in the study period for column, "Patients".

**Z scores using BMI measures in the year prior or after the index date or date of any consultation and not including measures recorded at ages below 3 years.

Figure 1 shows the frequency and proportions of primary care encounters in each category of foot and ankle health diagnoses during the study period. Most were for diagnoses categorised as "musculoskeletal" (34%), followed by categories "unspecified pain" (22%), "dermatological" (21%), "infection" (11%), "fracture" (8%) and "miscellaneous" (4%). The top codes per category are provided in S2 Table. The top codes overall are in Table 2 – "ingrowing great toenail" was observed 110,624 times during the study period, representing 16% of total codes, followed by "foot pain" at 10% and "paronychia of toe" at 7%. The top codes according to gender are provided in S3 Table.

Rates of foot and ankle health consultations peaked at 601 consultations per 10,000 patient years among males aged 10 to 14 years in 2018 and 641 consultations per 10,000 patient year among females aged 10 to 14 years in 2015 (Fig.2). The average rate across the study period was 343 (standard deviation 178) per 10,000 patient years overall and 352 (SD=179) and 333 (SD=179) for males and females respectively.

Table 3 shows incident rate ratios (IRRs) for foot and ankle consultations during the study period, unadjusted and adjusted for age group, gender, year and region. Female gender was associated with lower rates of attendance at primary care for foot and ankle health than male gender (adjusted rate ratio [ARR] 0.96; 95% confidence interval [CI] = 0.95 to 0.96). All age groups were associated with lower rates of attendance for foot and ankle health compared to the reference group of 10 to 14 years, particularly for the youngest age category (0 to 4

years) (ARR 0.28; 95% CI 0.27 to 0.28). There appeared to be regional variation in rates with most regions associated with a higher rate of foot and ankle health consultations compared to the reference region of the South East apart from London, which was associated with a lower rate (ARR 0.74; 95% CI 0.68 to 0.81). There were no associations detected for years of the study period compared to the reference year of 2015, until 2020 and 2021 which were both associated with lower rates: 2020 (ARR 0.62; 95% CI 0.61 to 0.63) and 2021 (ARR 0.71; 0.70 to 0.72).

After exclusion of patients with insufficient follow-up time, there were 83,197 (21%) out of 398,952 with repeat visits for foot and ankle health within six months. Those in black, Asian and other ethnic groups had lower odds of repeat visits compared to those in the white group, as did girls compared to boys (odds ratio 0.95, 95% confidence interval 0.93 to 0.96) (Fig.4). There were positive associations between repeat visits and health conditions: autism (1.12, 1.08 to 1.17); diabetes (1.21, 1.14 to 1.28); intellectual disabilities (1.13, 1.07 to 1.20) and juvenile arthritis (1.73, 1.48 to 2.03). There were 24,294 (15%) out of 167,472 musculoskeletal index visits with repeat visits within six months which was negatively associated with all other age categories compared to those aged 10 to 14 years and positively associated with female compared to male gender (supplementary Figure 1). There were 19,867 (24%) out of 82,182 dermatological index visits with repeat visits within six months which was negatively associated with younger age compared to those aged 10 to 14 years, the female compared to male group and all other ethnic groups compared to the white ethnic group (supplementary Figure 2). There were 20,165 (19%) out of 104,667 unspecified pain index visits with repeat visits within six months which was negatively associated with all other age categories compared to those aged 10 to 14 years and all other ethnic groups compared to the white ethnic group (supplementary Figure 3). There were 11,744 (23%) out of 51,770 infection index visits with repeat visits within six months which was negatively associated with younger age categories compared to those aged 10 to 14

184 years and all other ethnic groups compared to the white ethnic group (supplementary Figure
185 4).
186
187 The average general practice in our sample had approximately 10,000 patients and 3,500
188 patients aged 18 or younger (Table 4). In one year, such a general practice could expect to
189 see 103 patients (83 to 122) with a first consultation for a foot and ankle health problem; 41
190 patients (28 to 53) with musculoskeletal foot and ankle health issues, 21 with dermatological
191 (12 to 30) and 25 with unspecified pain (15 to 35).

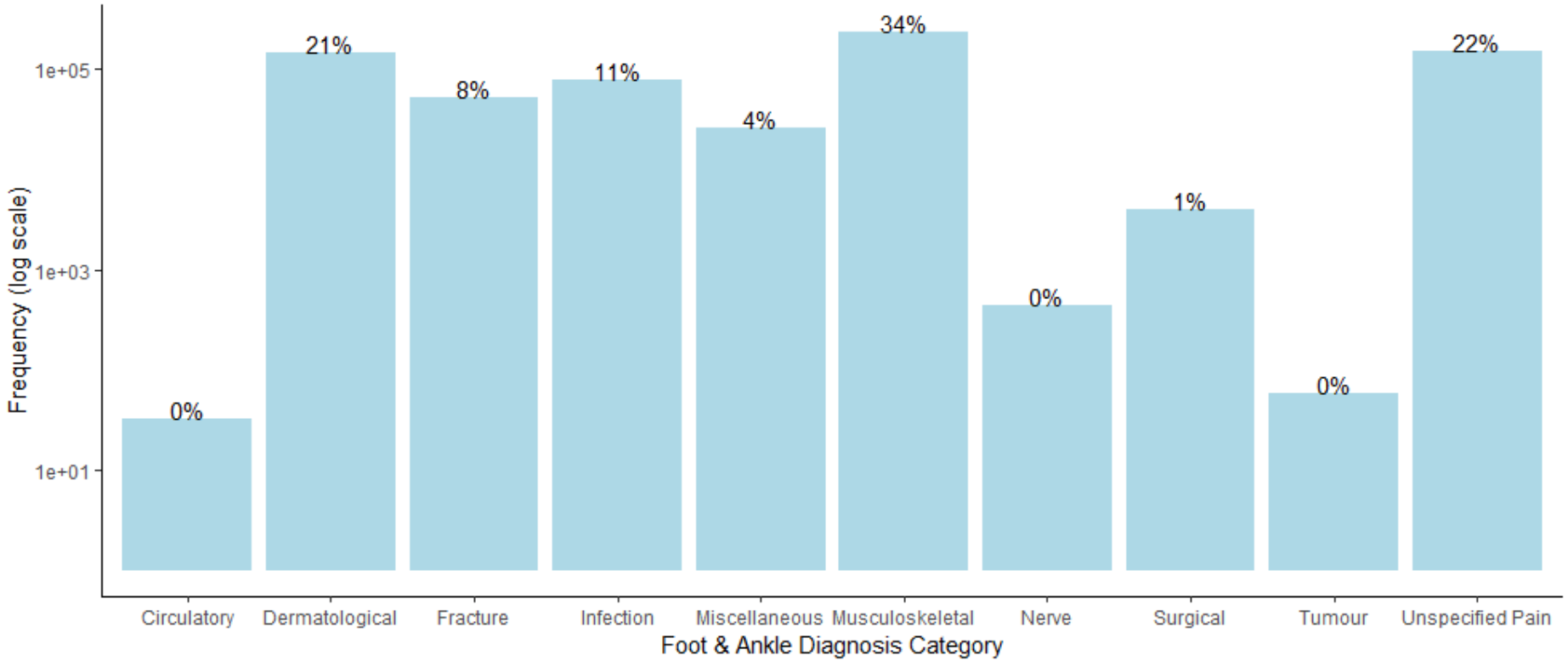

Figure 1 Frequency of primary care encounters in each category of foot and ankle health diagnoses (n = 687,753) from 1st January 2015 to 31st December 2021, labels are proportions of overall total.

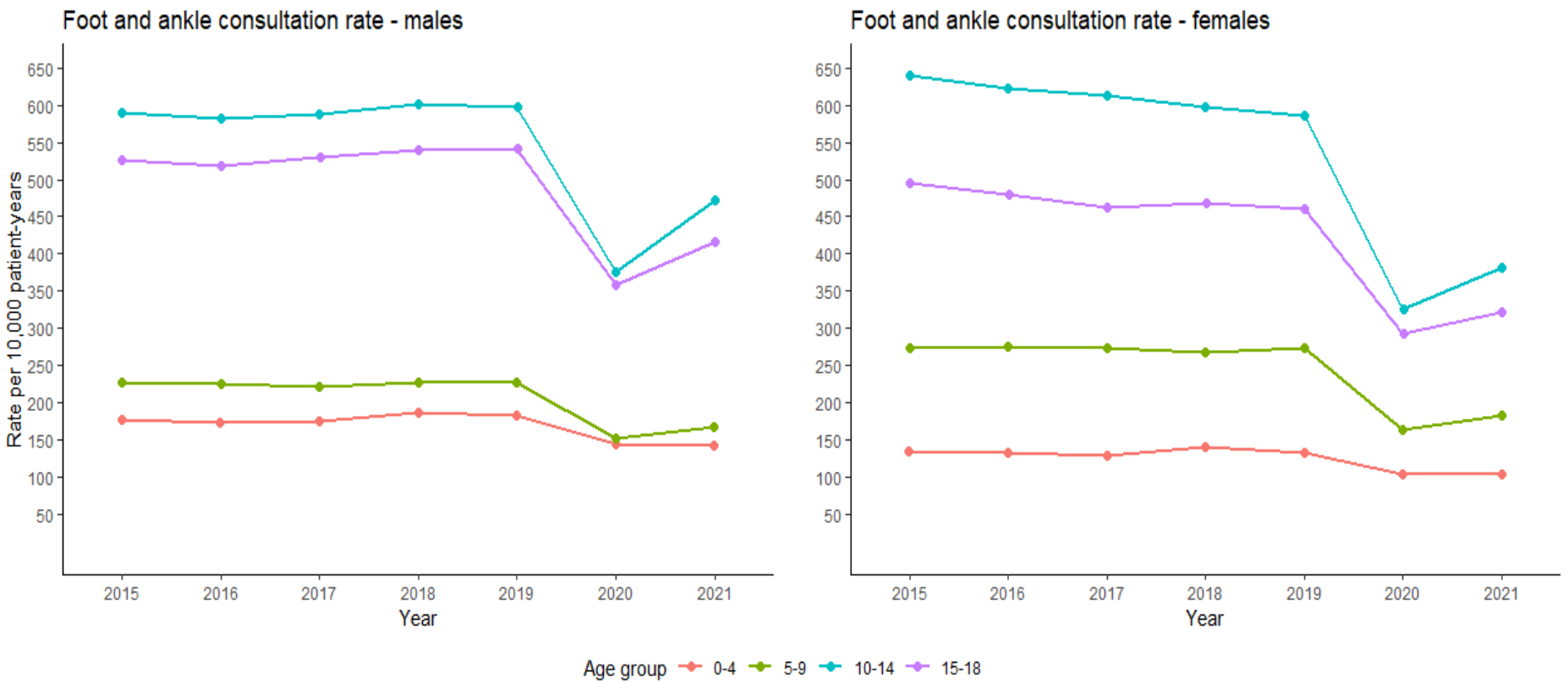

Figure 2 Rate per 10,000 patient-years of foot and ankle consultations in CPRD (2015 to 2020)

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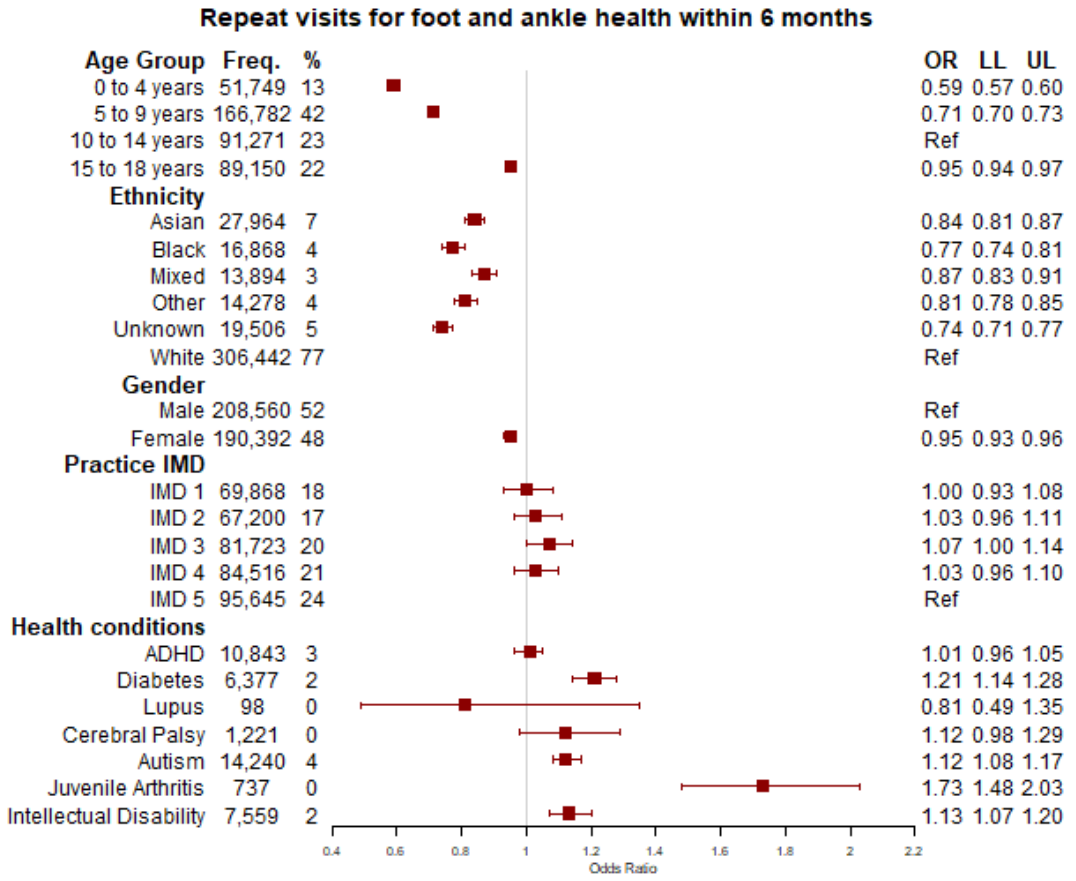

206

207 Figure 3 Logistic regression model of variables associated with the outcome of repeat visits for all foot and ankle
208 health encounters within 6 months during the study period.

209

210 Table 2 Frequency of the 10 most commonly recorded foot and ankle consultation codes

Code Description	Frequency (%) [a]
Ingrowing great toenail	110,624 (16)
Foot pain	66,059 (10)
Paronychia of toe	45,009 (7)
Ankle sprain	43,477 (6)
Ankle pain	38,965 (6)
Ankle injury	35,022 (5)
Foot injury	25,691 (4)
Injury of toe	19,958 (3)
Heel pain	17,987 (3)
Flat foot	16,446 (2)

211 [a] **Percentage of overall code total, n = 687,753**

212

213

214 Table 3 Poisson regression analysis showing unadjusted and adjusted relative rates for cohort characteristics.

Variable		Unadjusted	Adjusted [a]
Gender			
	Male	Ref.	Ref.
	Female	0.95 (0.94 to 0.96)	0.96 (0.95 to 0.96)
Age group			
	0 to 5	0.28 (0.27 to 0.28)	0.28 (0.27 to 0.28)
	6 to 9	0.42 (0.42 to 0.43)	0.42 (0.41 to 0.43)
	10 to 14	Ref.	Ref.
	15 to 18	0.84 (0.83 to 0.85)	0.84 (0.84 to 0.85)
Region			
	South East	Ref.	Ref.
	East Midlands	1.09 (0.91 to 1.31)	1.10 (0.91 to 1.31)
	East of England	1.20 (1.03 to 1.40)	1.21 (1.03 to 1.41)
	London	0.72 (0.66 to 0.78)	0.74 (0.68 to 0.81)
	North East	1.26 (1.09 to 1.45)	1.27 (1.10 to 1.46)
	North West	1.06 (0.98 to 1.15)	1.08 (0.99 to 1.17)
	South West	1.25 (1.14 to 1.38)	1.25 (1.13 to 1.39)
	West Midlands	0.99 (0.91 to 1.08)	0.99 (0.91 to 1.08)
	Yorkshire and The Humber	1.12 (0.95 to 1.31)	1.09 (0.93 to 1.28)
Year			
	2015	Ref.	Ref.
	2016	0.99 (0.98 to 1.01)	0.98 (0.97 to 1.00)
	2017	1.00 (0.98 to 1.01)	0.98 (0.97 to 0.99)
	2018	1.02 (1.00 to 1.04)	0.99 (0.98 to 1.00)
	2019	1.02 (1.00 to 1.03)	0.98 (0.97 to 0.99)
	2020	0.65 (0.64 to 0.66)	0.62 (0.61 to 0.63)
	2021	0.75 (0.74 to 0.77)	0.71 (0.70 to 0.72)

215 [a] Model was adjusted for age, gender, region and included a random effect to account for clustering
216 by practice.
217
218 Table 4 Numbers of consultations and repeat visits for foot and ankle diagnoses and diagnosis categories in a
219 general practice with 10,000 patients.

Measures		No index consultations per year expected in general practice with 3,500 CYP patients * †
Total		103 (83 to 122)
Diagnosis category		
	Musculoskeletal	41 (28 to 53)
	Dermatological	21 (12 to 30)
	Unspecified Pain	25 (15 to 35)
	Infection	11 (5 to 18)
	Fracture	8 (3 to 14)
	Miscellaneous	4 (0 to 8)
	Surgical	1 (-1 to 2)
	Nerve	0 (0 to 1)
	Tumour	0 (0 to 0)
	Circulatory	0 (0 to 0)
Diagnoses		
	Ingrowing great toenail	15 (8 to 23)
	Foot pain	12 (5 to 19)
	Paronychia of toe	7 (2 to 12)

Ankle sprain	10 (4 to 16)
Ankle pain	7 (2 to 12)
Ankle injury	6 (1 to 10)
Foot injury	5 (1 to 10)
Injury of toe	3 (0 to 7)
Heel pain	3 (0 to 6)
Flat foot	4 (0 to 7)

*During study period 2015 to 2019 (Covid-19 pandemic years excluded)
† Number of CYP in average general practice of 10,000 patients

DISCUSSION

Summary

This population-based cohort study explored trends in GP encounters for foot and ankle problems in CYP from 2015 to 2021. This study reports the largest analysis of foot and ankle problems in CYP to date and, among the 416,137 patients with 687,753 encounters for foot and ankle problems, identified that over a third of diagnoses were of musculoskeletal origin (34%). The average rate of foot and ankle health consultations across the study period was 343 per 10,000 patient years overall, peaking at 601 consultations per 10,000 patient years among males aged 10 to 14 years in 2018 and 641 consultations per 10,000 patient year among females aged 10 to 14 years in 2015.

Strengths and limitations

A key strength of this study is the high-quality data [14] which we've drawn from a large, longitudinal database, and has enabled us to describe trends in rates over time. The overall validity of the CPRD is considered high [14] but has not been established in foot and ankle health. The study population was sampled using a list of diagnosis codes established in previous research [12] and further refined with the input of clinical experts. Codes were categorised to highlight the clinical relevance of the descriptive findings and exploratory analyses, however, where codes were generic or ambiguous, it is likely that categories could overlap, for example, "ankle pain", "ankle sprain" and "ankle swelling" were each in different categories but could all be equivalent diagnoses. There were some missing data for

covariates, in particular, BMI, where, due to the age of the population and the likelihood for BMI to change across the study period, only the BMI scores within the year of diagnoses were considered. A previous study reporting CPRD data for foot and ankle conditions indicated the potential for this data source to underestimate the burden of this health issue where chronic conditions were not recorded after the initial visit [12]. This may have led to the underestimation of repeat visits in our study, particularly in the analysis of musculoskeletal index diagnoses. Studies of CPRD across a range of health conditions indicate that the completeness of data recording can be enhanced through consideration of linked data [22]. Foot and ankle health diagnoses such as fractures, may be more accurately recorded in secondary care. A complete depiction of such diagnoses as well as self-referral or onward referrals within secondary care are likely to be more accurately captured through used of CPRD's linked HES data.

Comparison with existing literature

Musculoskeletal diagnoses were the most common in our cohort and this finding echoes findings from a UK analysis of paediatric presentations with musculoskeletal problems in primary care [2]. In addition to what is currently known, our data offers a broader analysis of reasons for GP encounters and identifies unspecified pain (22%) and dermatological conditions (21%) as additional reasons for primary care encounters. Given the typical codes used within the unspecified pain category (see table 2) it is possible that many of these are of musculoskeletal origin and thus, the prevalence may be underestimated. Linked with existing UK epidemiological analysis [2], our data also identified that children aged 10 – 14 years of age were most likely to present in primary care. We do not anticipate that one mechanism underpins this finding but, as has been reported, it is likely that rapid growth and skeletal changes [23] are a contributory factor. There was a high rate of dermatological conditions in our findings and ingrowing toenail(s) was the most commonly recorded consultation code.

Our findings demonstrated that children from areas of low IMD had greater odds for repeat access to services. Several sociodemographic and medical characteristics have been associated with frequent attendance in primary care in children [24] but there is little evidence documenting the factors specific to repeat attendance for foot and / or ankle problems. In an analysis of CPRD data for foot and ankle pain across the lifespan [12] there wasn't a specific pattern for foot and/or ankle pain and socioeconomic group, whereas in an analysis of Australian data, children from disadvantaged socioeconomic areas had a significantly higher GP management rate of foot, leg and ankle conditions [3]. Linked with this, children from all ethnic groups (except white) had lower odds of repeat access to GP services for their foot and/or ankle problems. Findings from a recent scoping review [25] identified ethnic differences with access to a range of healthcare services but, with our current work, we are unable to determine whether this represents an inequity with services. Further in-depth qualitative work is recommended to explore this further. Our findings also demonstrate that children with existing medical conditions had higher odds of repeat visits within six months which may be indicative of higher need among these groups. As discussed, medical characteristics have been associated with more frequent attendance but we must caution that these findings might reflect better engagement with primary care services. There appears to be regional variation in the rate of foot and ankle consultations with London in particular appearing to have much lower rates than the South East. The years 2020 and 2021 were associated with lower rates in visits for foot and ankle care, which coincides with the timing of the Covid-19 pandemic and associated lockdowns and is aligned with literature demonstrating lower health service attendance during this time [26]. Further research is required to understand whether this decline reflects a reduction in need, whether access has returned to pre-pandemic levels in the post-pandemic period and the effect on health inequalities. Evidence from NHS England suggests there continues to be huge backlogs in care, particularly for CYP requiring community services such as physiotherapy [27].

Implications for research and practice

The data reported in this study outlines the breadth of foot and ankle problems presenting in CYP in primary care services. Our findings also support the need for more research in this area to inform policy-making and service provision. Given the complexity of some of these problems and the potential for repeat demand on services, we recommend greater integration between GP services and those provided by allied health professionals such as podiatrists and physiotherapists, for example, through The Network Contract Directed Enhanced Service Additional Roles Reimbursement Scheme [28]. Further research is required to understand the reasons for regional and sociodemographic variation in attendance rates and repeat visits for foot and ankle health.

Declarations

Contributors

Ethical approval

The protocol was approved by the CPRD Independent Scientific Advisory Committee (ISAC protocol 22_002137).

Funding

Competing interests

Data sharing

The study is based on data from the Clinical Practice Research Datalink (CPRD) obtained under license from the UK Medicines and Healthcare Products Regulatory Agency (MHRA); however, the interpretation and conclusions contained in this report are those of the authors alone. Requests for access to data from the study should be addressed to the corresponding author at emma.rezel-potts@kcl.ac.uk. All proposals requesting data access will require approval from CPRD before data release.

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