The Paediatric Voice Clinic

Smillie I[1], McManus K[1], Cohen W[2], Wynne D1.

Department of Paediatric Otolaryngology, Royal Hospital for Sick Children, Glasgow.

[2] School of Psychological Sciences and Health, University of Strathclyde

Background: Prevalence of paediatric voice disorders has been reported as 6-9% in children of school age. The appropriate diagnosis and management of paediatric voice disorders is essential for progress in education and psycho-social development. Accurate assessment is important as similar symptoms can have aetiologies of variable significance from benign conditions to airway concerns. The following article presents a review of a UK tertiary paediatric voice clinic experience of 154 patients to assess referral patterns, diagnosis, management and socio-economic variations.

Methods: An audit of 195 consecutive appointments between October 2009 and September 2013 at a monthly paediatric voice clinic based at the Royal Hospital for Sick Children in Glasgow. Information relating to age, gender, source of referral, laryngoscopy performed, diagnosis, ENT management and socioeconomic status based on Scottish Index of Multiple Deprivation (SIMD) scores was collated.

Results: Of the 154 new patients 86 were male and 68 were female (ratio 1.26:1). The age at first clinic appointment shows a trimodal peak at ages 5, 8 and 11 years old. General Practitioners were the main referral source (46%). Vocal cord nodules accounted for 52% of diagnoses and there was a male predominance within this diagnostic category. Clinic attendance was most common from SIMD groups 1 (most deprived) and 5 (least deprived). Analysis of the muscle tension dysphonia group indicates that they are more likely to come from social groups 4 or 5 (69%) and affect an older age group (mean age 10.4 years). From the total 182 patients seen over the study period 114 (63%) successfully tolerated nasoendoscopy in the outpatient setting. 135 patients (88%) were discharged after initial consultation, with 19 patients (12%) being brought back for follow-up.

Discussion: A dedicated paediatric voice clinic is the optimal method for assessment, diagnosis and management of these patients. Diagnosis is possible on the majority of the patients in clinic, with the predominant pathology being vocal cord nodules that receive speech and language therapy. Socioeconomic group appears to have an influence on paediatric voice particularly vocal fold nodules and muscle tension dysphonia.

Introduction

Voice disorders within adult otolaryngology are well established with departments utilising a multidisciplinary based clinic for managing these patients. This is now being established for a paediatric population in UK centres. Prevalence of paediatric voice disorders has been reported as 6-9% in children of school age[1]. The appropriate diagnosis and management of paediatric voice disorders is essential for progress in education and psycho-social development. Accurate assessment is important as similar symptoms can have aetiologies of variable significance from benign conditions to airway concerns. Furthermore, similar pathologies can have different impacts on physical-functional and social-emotional health emphasising the need for appropriate management strategies[2].

A retrospective review found considerable variation in assessment and management of paediatric voice disorders in a tertiary general paediatric otolaryngology clinic and recommended the establishment of a dedicated paediatric voice clinic[3]. There is still debate about the assessment (history, examination, laryngoscopy) within a paediatric voice clinic. A review of the European Laryngological Society (ELS) recommendations suggested that the four assessments of function (perceptual evaluation of voice, videostroscopic examination, evaluation of aerodynamic performance and acoustic analysis) should be implemented within a paediatric population[4]. In addition, subjective rating of the impact of voice disorder on quality of life should be assessed despite a lack of validated questionnaires to evaluate both parent and child concerns[5].

The following article presents a review of a UK tertiary paediatric voice clinic experience of 154 patients to assess referral patterns, diagnosis, management and socio-economic variations.

Methods

An audit of 195 consecutive appointments between October 2009 and September 2013 at a monthly paediatric voice clinic based at the Royal Hospital for Sick Children in Glasgow. The clinic consists of a Consultant Otolaryngologist and a research Speech and Language Therapist (SALT) serving a population of approximately 1.2 million over the West of Scotland. All referrals were assessed by history, general otolaryngology examination and outpatient laryngoscopy (if not possible laryngoscopy under general anaesthetic may be offered).

Information relating to age, gender, source of referral, laryngoscopy performed, diagnosis, ENT management and socioeconomic status based on Scottish Index of Multiple Deprivation (SIMD) scores was collated.

The SIMD 2012 score was calculated using the postcode for each patient. The SIMD splits postcodes into 'datazones' and is calculated by combining 38 indicators that are across 7 domains - current income, employment, health, education, geographic access, crime and housing[6]. This divides the population into 5 groups ranging from most deprived at 1 and most affluent at 5.

Results

195 appointments were attended between October 2009 and September 2013. 13 patients were excluded; 11 were referred with ENT problems other than vocal dysfunction, 1 was referred with speech delay and the final exclusion was due to no patient demographics. The remaining 182 appointments for vocal dysfunction are the focus of this study.

154 of the appointments were for new patients, 18 were follow-up and 10 appointments were re-referrals for unresolved vocal dysfunction (7 from SALT, 2 from GP, 1 from Paediatric medicine).

Of the new patients, 86 were male and 68 were female (ratio 1.26:1). Figure 1 illustrates the age at first clinic appointment and there is a trimodal peak at ages 5, 8 and 11 years old. The youngest child seen in clinic was 11 months old, the eldest was 16.7 years old. The mean age at first appointment was 7.5 years and median age was 7.2 years. Female patients are predominant under the age of 6 and over 11 years of age, however male patients form the majority from the primary school age group.

General Practitioners were the main referral source (table 1), but there was significant contributions from subspecialties including the cleft team at 12.3%. Table 2, shows the primary diagnosis following outpatient consultation or further investigation. Vocal cord nodules accounted for 52% and there was a male predominance within this diagnostic category. Overall a child is most likely to present with dysphonia secondary to vocal cord nodules at age 5-6 years old (figure 2).

Figure 3, illustrates the spread of deprivation amongst patients attending the clinic, SIMD data was not available for 3 patients' postcodes. This illustrates higher attendance in social groups 1 and 5. Patients from the most deprived backgrounds tend to present earlier whilst those from the least deprived backgrounds tend to present at a later age (figure 4). Deprivation specific for vocal cord nodules is represented in figure 5, which shows similar results to the total data with more patients coming from SIMD 1. Analysis of the muscle tension dysphonia group indicates that they are more likely to come from higher socioeconomic groups with 69% being in SIMD 4 or 5.

Figure 6 illustrates the spread of the 4 most common diagnoses by age. No abnormality is the second most likely diagnoses after vocal cord nodules between ages 4 and 7 years. Muscle tension dysphonia is present at a low level from age 4 years onwards with a mean age of 10.4 years. Vocal fold palsy is most prevalent in the preschool and early secondary school age groups.

From the total 182 patients seen over the study period 114 (63%) successfully tolerated nasoendoscopy in the outpatient setting. The youngest child to tolerate nasoendoscopy in clinic was 18 months old. Of the 114 patients who underwent outpatient nasoendoscopy, 10 (9%) underwent inpatient microlaryngobronchoscopy (8 had intervention at same operation). Of the 68 patients who did not undergo outpatient nasoendoscopy, 34 (50%) underwent inpatient microlaryngobronchoscopy.

135 patients (88%) were discharged after initial consultation, with 19 patients (12%) being brought back for follow-up. The majority of patients with an active outcome went on to receive input from SALT, which is largely due to the predominating diagnosis of vocal cord nodules.

Discussion

This study group has given a typical representation of the voice disorders within the paediatric population of the West of Scotland. There were no publications found regarding current voice clinic activity for the paediatric population within the UK.

The prevalent age group in this study was from 3-12 years of age which contrasts past studies that found greater presentations between 8-14 years of age[7]. It is unlikely that there has been a change in the age of onset of vocal fold nodules or other conditions. This disparity could be due to increased GP awareness of tertiary services provided for this age group and subsequent early referral. Alternatively, it may be due to increased referrals from other sources such as the cleft team and SALT (18.1% of referrals in this study) that have contact with these patients at an earlier stage.

46.1% of patients were referred by GPs which would be expected for the majority of the benign diagnoses. However, 69% of the patients referred with vocal fold paralysis were from ENT Consultants or Paediatric medicine with only 15% coming from primary care. Vocal cord palsy represents 8.4% of the study group which is higher than would be expected for a paediatric voice clinic with cord paralysis only accounting for 10% of all congenital anomalies of the larynx[8]. The high prevalence in this study represents the specialist and complex inpatient work at the Royal Hospital for Sick Children in Glasgow with previous studies indicating 43% of vocal fold paralysis in children being from an iatrogenic cause[9].

The ratio of boys to girls seen was 1.26:1 which compares with past studies[10]. This gender ratio in the vocal nodules group is 1.58:1, which is lower than previously demonstrated ratios of >2:1[11]. If we exclude vocal cord nodules from the analyses then more girls were seen in the clinic over the study period. This represents the higher percentage of females attending with muscle tension dysphonia (MTD) and posterior glottic chink, which is comparable with the adult population[12]. Similarly, this group of patients are older (mean age ~~greater than ten~~>10). This would be expected for a voice disorder that has evolved from increased use of their voice in stressful situations resulting in excessive or abnormal laryngeal tension[12].

A higher percentage of these patients originate from SIMD group 4 or 5. With multiple aetiological factors for MTD it is difficult to attribute a possible cause. Whether children in these SIMD groups are more likely to misuse/abuse their voice, have psychosocial influences or be exposed to voice use in stressful situations is unclear.

The overall data on SIMD groups presented within this study largely represents the children with vocal fold nodules. Vocal fold nodules are caused by voice misuse, over phonation and trauma[13]. Children from regions of socioeconomic deprivation tend to come from larger families, which may explain the voice misuse/abuse in SIMD group 1 at an early stage[14]. In addition, children from larger families may be at increased risk of upper respiratory tract infections, which may have an influence on development of vocal cord nodules[15]. Personality traits have also been linked in voice disorders with aggression and anxiety contributing[15]. It has been shown that school children from lower socioeconomic groups demonstrate these traits more commonly[16]. SIMD group 5 patients with vocal nodules within this study are older at presentation. This may explain the increased numbers in this socioeconomic group as the child increases voice use in school and extra curricular activities more typical of the adult population.

Summary

A dedicated paediatric voice clinic is the optimal method for assessment, diagnosis and management of these patients. Diagnosis is possible on the majority of the patients in clinic, with the predominant pathology being vocal cord nodules that receive speech and language therapy. Socioeconomic group appears to have an influence on paediatric voice particularly vocal fold nodules and muscle tension dysphonia. Further research is required to evaluate outcomes in this challenging group of patients and to establish the true value of the paediatric voice clinic.

FIGURES

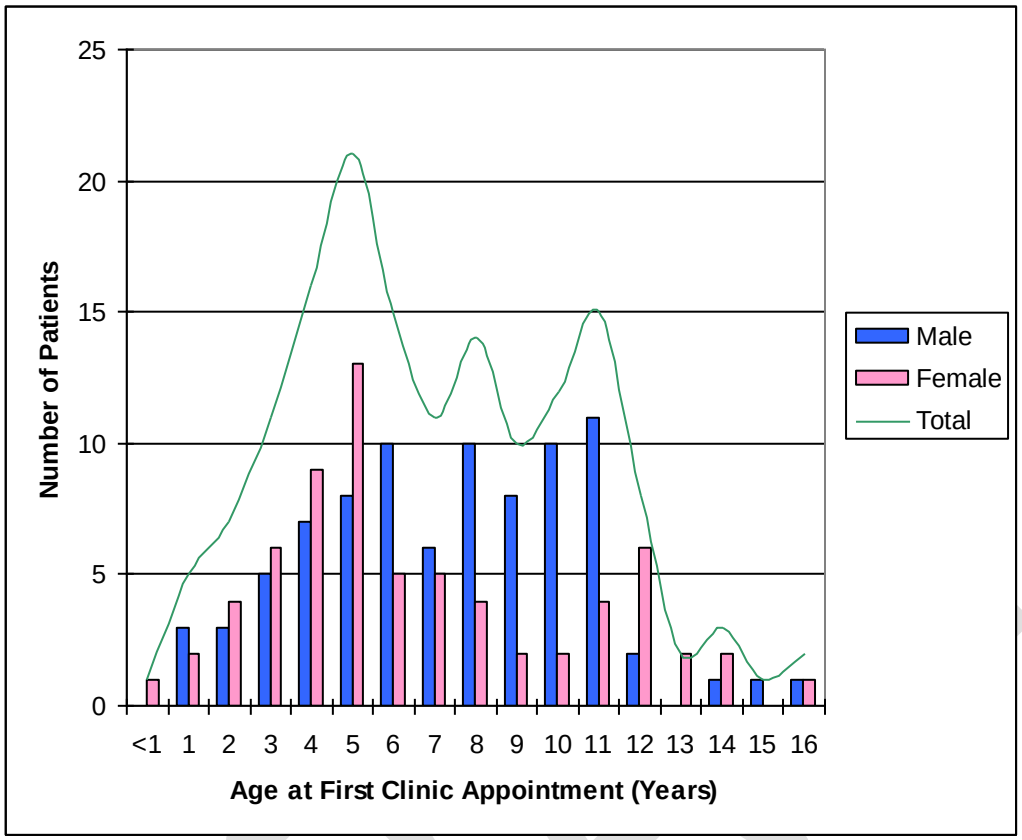

Figure 1. Age at first appointment.

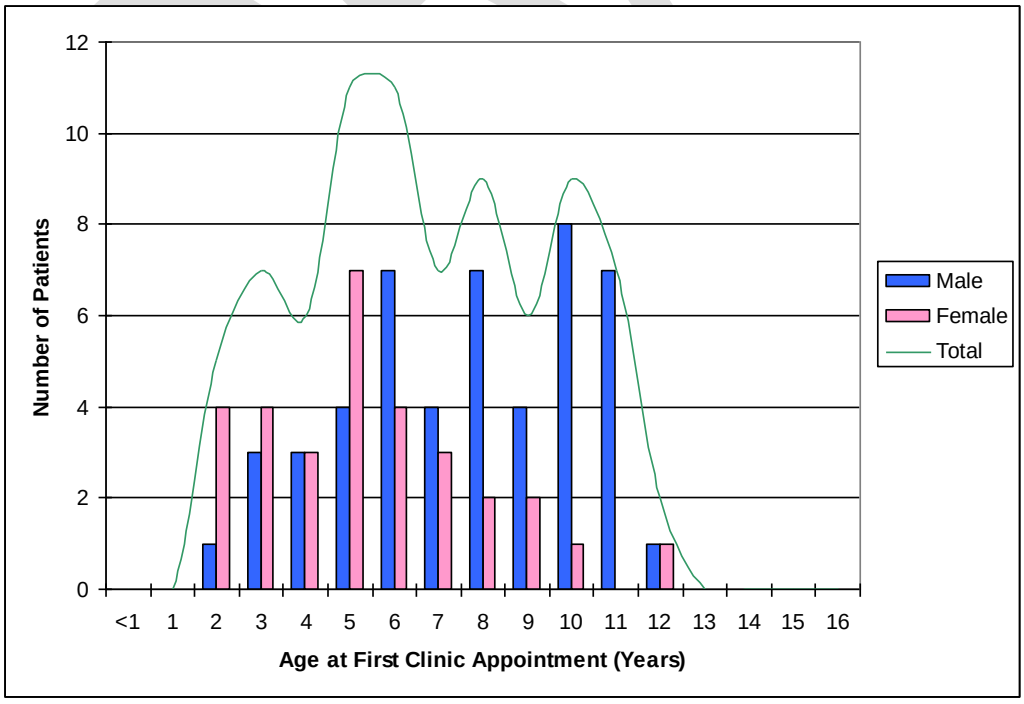

Figure 2. Age at first attendance for patients with a diagnosis of vocal fold [W1]nodules.

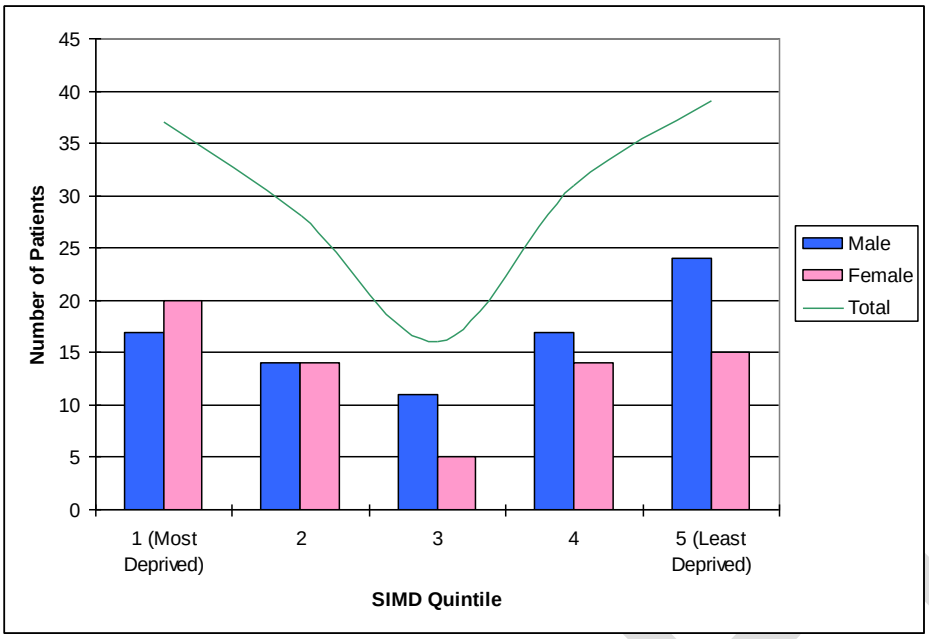

Figure 3. Scottish Index of Multiple Deprivation (SIMD) scores for 154 patients attending voice clinic.

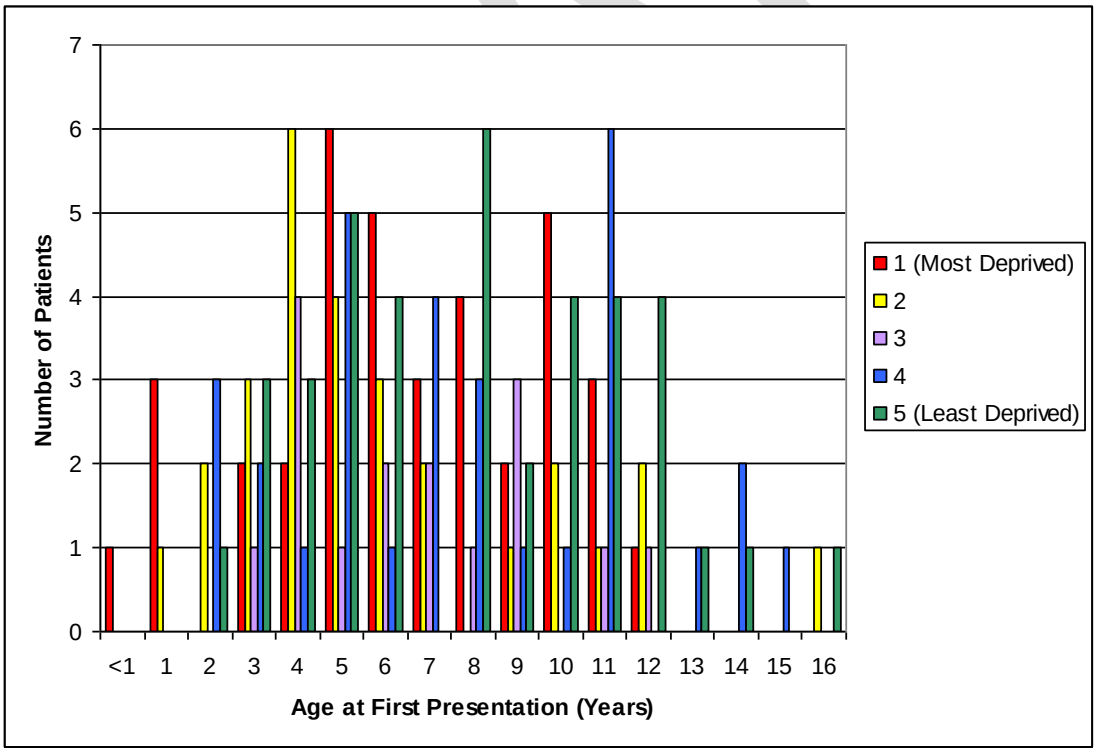

Figure 4. Age at first attendance as per SIMD group.

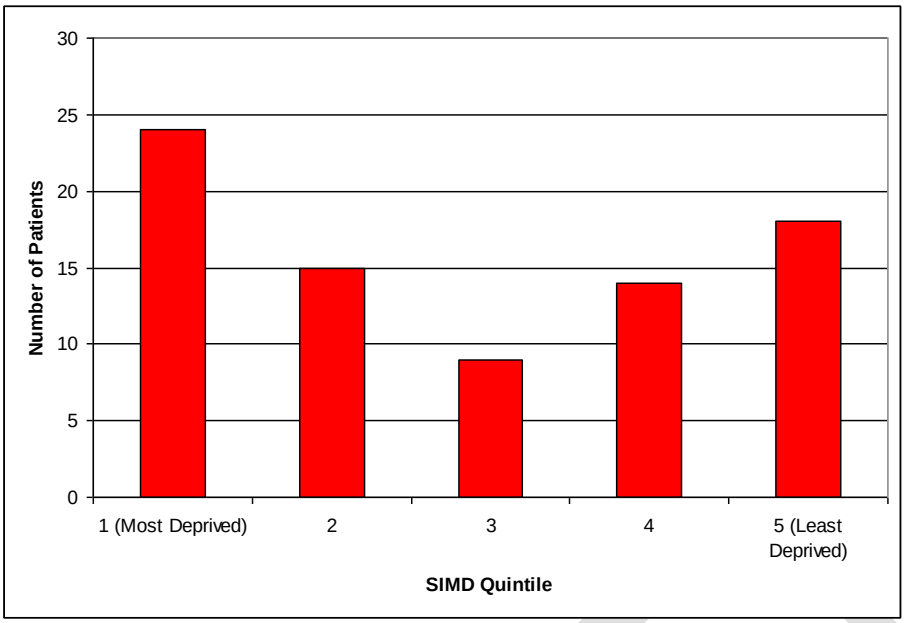

Figure 5. Scottish Index of Multiple Deprivation (SIMD) scores with diagnosis of vocal nodules.

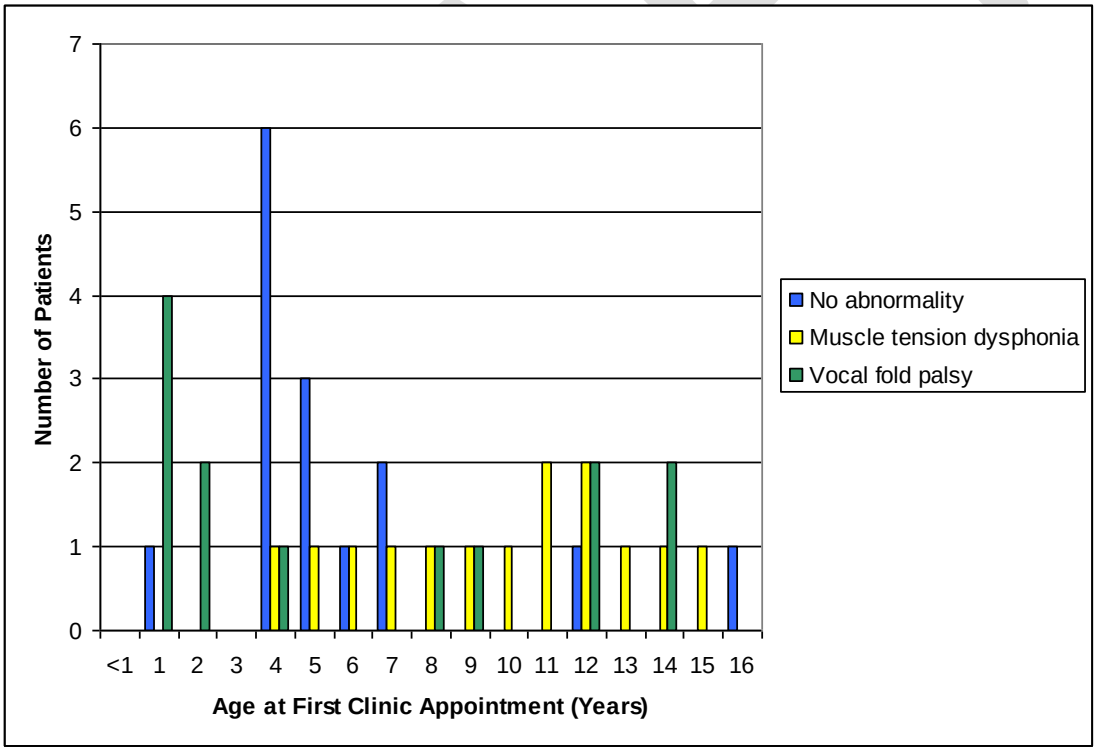

Figure 6. Age at first attendance for most common diagnoses excluding vocal fold nodules.

TABLES

Table 1. Source of referral to paediatric voice clinic.

Source of Referral	Number of Patients	% of Referrals
GP	71	46.1
Local ENT	24	15.6
Cleft Clinic	19	12.3
Paediatric Medicine	18	11.7
Other ENT	10	6.5
SALT	9	5.8
Paediatric Surgery	2	1.3
Audiology	1	0.7

Table 2. Diagnosis made within paediatric voice clinic

Diagnosis	Number of Patients		
	Male	Female	Total
Vocal cord nodules	49	31	80
No abnormality	8	7	15
Muscle tension dysphonia	6	8	14
Vocal fold palsy	9	4	13
Intracordal cyst	5	1	6
Posterior glottic chink	1	4	5
Adenoids	1	1	2
Inconclusive	1	1	2
Post-laryngotracheal reconstruction	1	1	2
Puberphonia	1	1	2
Respiratory papillomas	0	2	2
Crico-arytenoid joint fixation	1	0	1
Double aortic arch	0	1	1

Dysarthria	1	0	1
Ehlers-danlos syndrome	1	0	1
Glottic web	0	1	1
Inhaler-related dysphonia	0	1	1
Layngeal granulomas	0	1	1
Laryngomalacia	0	1	1
Presumed inflammatory process	0	1	1
Reflux	0	1	1
Vocal cord polyp	1	0	1

1. Hirschberg J et al, (1985) Voice disorders in children. Int J. Pediatric Otorhinolaryngol. 32, 109-125.
2. Jacobson BH, Johnson A, Grywalski C et al The voice handicap index (VHI) development and validation. AM J Speech Lang Pathol. 1997;6;66-70
3. Connelly A, Clement A, Kubba H. (2009) Management of dysphonia in children. J. Laryngol. Otol. 123, 642-647.
4. Cohen W. Wynne D. Kubba H. McCartney E. Development of a minimal protocol for assessment in the paediatric voice clinic. Part 1: Evalating vocal function. Logopedics Phoniatrics Vocology, 2012;37;33-38.
5. Cohen W. Wardrop A. Wynne D. Kubba H. McCartney E. Development of a minimal protocol for assessment in the paediatric voice clinic. Part 2:Subjective measurement of symptoms of voice disorder. Logopedics Phoniatrics Vocology, 2012;37;39-44.
6. http://www.scotland.gov.uk/Topics/Statistics/SIMD/BackgroundMethodology
7. Van Leden H.V. (1985) Vocal nodules in children. Ear Nose Throat J. 61. 473-480.
8. Holinger PHBrown WT Congenital webs, cysts, laryngoceles and other anomalies of the larynx. *Ann Otol Rhinol Laryngol.* 1967;76744- 752
9. Hamid Daya et al, Pediatric Vocal Fold Paralysis. A long-term retrospective study.*Arch Otolaryngol Head Neck Surg.* 2000;126(1):21-25.
10. Angelillo N, Di Costanzo B, Angelillo M, Costa G, Barillari MR, Barillari U, Epidemiological study on vocal disorders in paediatric age. J Prev Med Hyg. 2008 Mar;49(1):1-5.
11. Mori K. Vocal fold nodules in children: preferable therapy. Int J Pediatr Otorhinolaryngol. 1999 Oct 5;49 Suppl 1:S303-6
12. Van Houtte E et al, Pathophysiology and Treatment of Muscle Tension Dysphonia: A Review of the Current Knowledge, J Voice, Volume 25, Issue 2, March 2011, Pages 202–207
13. Karkos PD, McCormick M. The etiology of vocal fold nodules in adults. Curr Opin Otolaryngol Head Neck Surg. 2009 Dec;17(6):420-3.
14. http://opinion.inquirer.net/22811/economic-deprivation-and-family-size
15. N. J. KAY, Vocal nodules in children -aetiology and management. *The Journal of Laryngology and Otology* August 1982. Vol. 96. pp. 731-736.
16. Basch CEJ. Aggression and violence and the achievement gap among urban minority youth. Sch Health. 2011 Oct;81(10):619-25.