Evaluation of paediatric vision screening and digital referral routines in an interprofessional setting in Norway

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Abstract

Vision is crucial for childhood development, and ensuring good vision in children is one of the United Nation's sustainability goals. Most countries have a childhood vision screening programme, and in Norway screening in children aged 4–5 years is performed in community health centres (CHC). Specialist health services such as ophthalmology and/or orthoptics are the referral bodies. However, access to these may be limited and they may be a long distance away from the child's home, while optometrists are often more available and accessible. This study aims to investigate if vision screening reliably detects vision problems and to explore if using paediatric optometry as a referral body can relieve the specialist health services. The study also aims to report frequency of refractive errors and management of vision problems in this age group.

Of 274 children who attended vision screening by school nurses at the CHC in Kongsberg, Norway, parents of 213 (77.7%) consented to a separate eye and vision examination by a paediatric optometrist. Agreements in screening results between school nurses and the paediatric optometrists were evaluated. Separately, an ophthalmologist and an orthoptist assessed records from the eye examinations through a digital communication tool (Eyecheck System AS). Agreements in diagnoses and management decisions between optometrists and the specialist health services were evaluated.

Amblyopia or ocular pathology was found in 1.9% of the children, which were all identified by the vision screening. The vision screening had a sensitivity and specificity of 62.3% and 58.6%, respectively, for detecting other vision problems in need of treatment or follow-up. Hypermetropia was present in 82.7% of the children (58.0% low, 18.5% moderate, 6.5% high hypermetropia), 16.4% had emmetropia and 1.0% had myopia. Glasses were prescribed to 8.5% of the children and 16.4% were scheduled for follow-ups. There was a high level of agreement in management between optometrists and specialists (ophthalmologist 80.3%, orthoptist 81.7%).

The vision screening reliably detected amblyopia and ocular pathology, and most refractive errors were detected. The high degree of agreement between the three eye care professions suggests that paediatric optometrists can be used as the referral body for this age group. Availability of a digital communication tool provides support for the paediatric optometrists in their decision making and can help relieve the specialist health services by providing children with an eye examination and vision correction earlier and more easily.

Keywords: vision screening, children, amblyopia, hypermetropia, refractive errors

Introduction

Vision plays an important role in the ability to learn, from the very beginning of life, throughout childhood and in adolescence. Optimal vision and eye health is critical for academic development, attaining a healthy life, social and economic independence, and optimised functional ability (Basch, 2011; Marshall et al., 2010; Narayanasamy et al., 2015). Indeed, vision is so important that the United Nations in 2021 included vision as one of the sustainability goals because good eyesight and eye health contribute directly to prospects for education and good health in children and young people (United Nations, 2022; Zhang et al., 2022). Children use their vision actively from birth, and neural feedback from the retina is crucial for normal visual development. Important visual functions develop and mature early in life, and visual disturbance can cause irreversible damage. Amblyopia is the main cause of vision loss in children (Kvarnström et al., 2001; Robaei et al., 2005) and it has been shown that children with amblyopia have reduced reading speed and motor skills compared to their peers (Kelly et al., 2015; 2020; Webber et al., 2008). Other negative consequences include lower social acceptance and self-esteem (Dudovitz et al., 2016; Tailor et al., 2022). For these reasons, most countries have a childhood vision screening program.

Vision screening in Norway is performed as a part of the mandatory routine examination at a community health centre (CHC) (Helsedirektoratet, 2021). Attendance rate for the health screening program for 4–5-year-olds is high (90.4–97.3%) (Statistisk Sentralbryå, 2022). The main purpose of vision screening is to detect amblyopia and other sight-affecting conditions, and the vision assessment includes monocular visual acuity at distance. Children who do not pass the screening criteria are referred to the specialist health service, which is most often an ophthalmologist, sometimes including an orthoptist or an optometrist. In Norway, prescription for refractive errors is within the scope of practice for ophthalmologists and optometrists, but not for orthoptists.

Uncorrected refractive errors are the main cause of decreased vision in the general population (Dandona & Dandona, 2001; Naidoo & Jaggernath, 2012). The prevalence and distribution of refractive errors depend on the location, the age, and the ethnicity of the population. Classification of refractive errors (power limits for determining hypermetropia, myopia and astigmatism), whether cycloplegia was used, and method of measurement are important factors that play a role in determining the prevalence. In Caucasian populations, hypermetropia is shown to be the most prevalent refractive error in the youngest age groups (Hashemi et al., 2018; Jiang et al., 2019; O'Donoghue et al., 2012; Sandfeld et al., 2018; Slaveykov & Trifonova, 2020), while the prevalence of myopia is much lower (Grönlund et al., 2006; Sandfeld et al., 2018) than in East-Asian and Southeast-Asian countries (Dirani et al., 2010; Goh et al., 2005; He et al., 2009). In Scandinavia, studies have reported higher occurrence of hypermetropia compared to myopia in both primary and secondary school children, and in adolescents (Demir et al., 2021; Falkenberg et al., 2019; Hagen et al., 2018).

While amblyopia is sight threatening and therefore important to discover, there is increasing knowledge and awareness of how mild to moderate non-amblyogenic uncorrected refractive errors may contribute to problems later in life. Hypermetropia is associated with reduced emergent literacy (Kulp et al., 2016) and reduced academic performance (Mavi et al., 2022), and may contribute to school dropout (Markussen et al., 2008). Detecting

and correcting refractive errors at an early stage is considered beneficial not only for visual development in the individual, but also to increase school attendance and improving academic performance (Dudovitz et al., 2020).

Even though Norway has a well-established welfare system, there is no mandatory vision screening program after the age of 4 years, and it is therefore fundamental to identify children with vision problems that may affect academic development at the vision screening at age 4–5 years.

This study aims to investigate whether vision screening and follow-up in a population of non-selected 4–5-year-olds in Norway can be used to detect and manage children with amblyopia and refractive errors. Further, the study explores agreement of clinical judgements between optometrists specialising in eye examinations in pre-school children, orthoptists and ophthalmologists by using a digital communication tool. A secondary aim is to investigate the frequency of refractive errors, and to determine the need for vision correction in this population.

Materials and Methods

Participants

The study was performed in a middle-sized Norwegian town, Kongsberg, which has about 28 000 inhabitants (1643 per km^2) and is representative of the Norwegian population regarding public health and socio-demographic status. In the health screening program between November 1st 2018 and October 31st 2019, 285 children aged 4–5 years were invited to attend the mandatory routine examination at the local community health centre (CHC), and 274 children (96.1%) attended. A total of 77.7% (n = 213) of the invited population consented to attend the National Centre for Optics, Vision and Eye Care (NCOVE) at the University of South-Eastern Norway for a full eye and vision examination.

All children attending the screening were invited to participate in the study, and those who consented were given an eye and vision examination by a paediatric optometrist at NCOVE.

Procedures

The school nurses at the community health centre were given a one-day learning and training course in vision screening, provided by NCOVE. During vision screening, the school nurses measured monocular visual acuity (VA) at a distance of 3 m, using a logMAR Lea symbol visual acuity chart according to the national guidelines for vision screening (Helsedirektoratet, 2021).

The eye and vision examinations at NCOVE were performed by paediatric optometrists. Monocular VA was measured at 6 m and binocular VA at 33 cm with logMAR Lea symbol visual acuity charts (Laméris Ootech, Ede, Netherlands). Stereo acuity (SA) was tested using the TNO stereo acuity test at 40 cm, and for those who could not complete the TNO test, the Lang II (Lang-Stereotest AG, Switzerland) was used. Ocular alignment was assessed by the Hirschberg test and the prism cover test (at 6 m and 40 cm). Ocular motility was assessed using a penlight, and near point of convergence using a fixation stick. Refraction was performed 30–40 minutes after the instillation of one drop of Cyclopentolate 1%, and two drops were used if the child had dark brown irises. Cycloplegic refraction was measured with a Huvitz HRK-8000A autorefractor (Huvitz Co. Ltd., Gyeonggi-do, Korea), substituted with cycloplegic retinoscopy when autorefraction could not be completed. Children with refractive errors outside predefined limits as defined by Leat (2011) (see below), also underwent cycloplegic retinoscopy to decide the final correction. Fundus photos were taken of both eyes. If the photos were of poor quality or there was any suspicion of abnormality, indirect ophthalmoscopy was performed. The optometrist made a diagnosis and prescribed the appropriate treatment (glasses or follow-up) as required.

Eye examination data as described above, and videos and photos from the eye and vision examination performed by an optometrist, were uploaded to a digital communication platform (Eyecheck System AS). The ophthalmologist and orthoptist did separate clinical judgments, made a diagnosis and suggested management.

Vision correction (glasses) was prescribed following predefined criteria according to Leat (2011). Children without amblyopia were given a prescription if they had myopia ≤ -1.00 dioptres (D), hypermetropia > +2.50 D, astigmatism ≥ 1.50 D (if oblique, ≥ 1.00 D) or anisometropia ≥ 1.00 D. Children with refractive errors close to the predefined criteria for correction were prescribed glasses or follow-up depending on the examiner's clinical judgment. Any suspected pathology or sight-affecting conditions were referred to the specialist health services at the local hospital.

The study followed the tenets of the Declaration of Helsinki and was approved by the Regional Committee for Medical and Health Research Ethics in Southeast Norway (REK 2018/1237). Both parents gave informed consent prior to inclusion in the study. Collection of VA data from the CHC was considered quality assurance and was approved by the Norwegian Agency for Shared Services in Education and Research (Sikt 402751).

Statistics

Statistical analysis was performed using Microsoft Excel and the IBM SPSS Statistics version 22. Pearson's correlations were used to look at covariations between tests. The α level was set to 0.05 for all statistical analyses.

Results

Vision Screening (CHC)

A total of 96.1% (n = 274) of the invited children presented for the mandatory health screening program during the test period. Seven children were already followed up by the local eye hospital, and four did not show for unknown reasons.

Mean age (± SD) was 49.7 ± 1.8 months (range 47–66 months, 50.0% males). Visual acuity (VA) was noted as the smallest line where three out of five symbols were seen on the logMAR Lea symbol visual acuity chart. VA was measured monocularly at 3 m for both eyes and binocularly at near, by a school nurse. VA was obtained successfully in most children. Mean VAs were 0.22 ± 0.10 logMAR (range 0.00–0.80) and 0.23 ± 0.12 (range -0.06–0.92) for the right and left eye, respectively. There was no significant difference between the right and left eyes (paired samples t-test, $t(226) = 0.13$, $p = 0.89$). Binocular VA at near was 0.23 ± 0.12 logMAR (range 0.00–1.00). A total of 57.7% (n = 158) of the children passed the VA criteria given in the national guidelines for vision screening.

There were 61 children attending the mandatory CHC vision screening whose parents did not consent to participation in the study. However, this study compared VA data collected by school nurses for these children as a quality control study. Mean VAs for the non-participating children were 0.19 ± 0.08 logMAR (range 0.00–0.60) and 0.19 ± 0.08 (range -0.06–0.50) for the right and left eye, respectively. Binocular VA at near was 0.19 ± 0.09 logMAR (range 0.02–0.44). 71.9% (n = 46) of these children passed the VA criteria given in the national guidelines for vision screening.

Eye examination (NCOVE)

A total of 77.7% (n = 213) of the invited population consented to attend NCOVE for a full eye and vision examination. Mean age was 51.2 ± 3.1 months (range 38–65 months, 48.8% males).

Gestational age was 39.7 ± 1.6 weeks (range 34–43 weeks). Most of the participants, 83.1% (n = 177), were of Northern European Caucasian ethnicity, i.e., both parents were born in Northern Europe (self-reported in the patient history). Other ethnicities (one or both parents) included African, 4.2% (n = 9), Middle Eastern, 4.2% (n = 9) and Asian, 5.2% (n = 11). Two children were premature (self-reported), born in week 34 and 35. Neither had received treatment for retinopathy of prematurity. One child had autism, and one had a genetic disorder. The remainder were healthy and did not report any previous eye or vision treatment.

Visual Acuity (VA)

The optometrists were able to obtain VA results for all children. Uncorrected VA was 0.10 ± 0.12 logMAR (range -0.10–0.90) in the right eye (RE), and 0.10 ± 0.13 (range -0.10–0.88) in the left eye (LE). There was no difference between the eyes (paired t-test, p = 0.37). Binocular near VA was 0.09 ± 0.12 logMAR (range -0.20–1.00).

The differences between VAs measured at the vision screening by the school nurses and VAs measured at the NCOVE eye examination were RE 0.13 ± 0.16 logMAR (range -0.80–0.78), LE 0.14 ± 0.14 logMAR (-0.58–0.68), and near 0.15 ± 0.16 logMAR (-0.80–0.88), and there was high correlation between the results from the vision screening and those measured at the NCOVE eye examination (r = -0.76, -0.54, and -0.59 for RE, LE and near, respectively). A Bland-Altmann plot revealed no proportional bias between VA measurements made by school nurses and at NCOVE. Further, there was no significant regression for the differences between the VA measurements ($F(1) = 0.867$, $p = 0.353$).

Stereoacuity (SA)

SA was in the range of 30–240″. Most children had SA of 60″ (72.8%, n = 155) or 120″ (14%, n = 30). Poorer SA was found in 12.7% (n = 27) children: five had SA of 240″ and one had SA of 480″ with the TNO test, 18 had 200″ and one had 550″ with the Lang test. Two children did not manage to complete any of the stereo tests.

Refractive errors

Cycloplegic autorefraction was completed in 198 (93.0%) children, while 9 (4.2%) underwent cycloplegic retinoscopy, and the remaining 6 (2.8%) underwent dry retinoscopy. The distribution of cycloplegic spherical equivalent refraction (SER) of right eyes is shown in Figure 1.

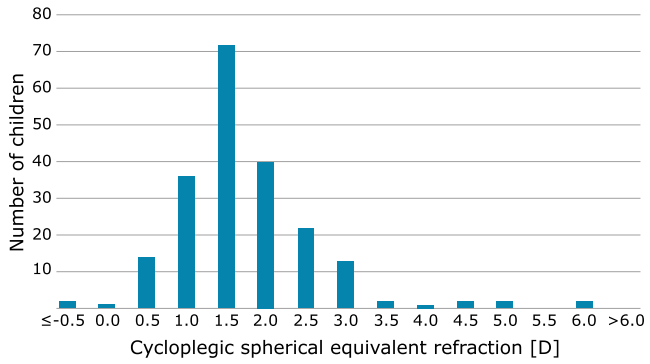

Figure 1: *Frequency of cycloplegic SER (D) of right eye in 207 children (SER values rounded up to the nearest 0.5 D).*

There was no significant difference between SER of right and left eyes (paired t-test, p = 0.05). Hypermetropia was the most prevalent refractive error (see Table 1). More than half the children (58.0%) had low hypermetropia, while 18.4% had moderate hypermetropia, and 6.3% had high hypermetropia. Emmetropia was found in 16.4% of the children, and only two (1.0%) had myopia. Glasses and follow-up were prescribed to 8.5% children, and 16.4% were prescribed follow-up only. For the remaining 75.1% no treatment was considered necessary.

Table 1: *The prevalence of refractive errors in the study population categorised by refractive groups*

Refractive error (definition)	Participants (n)	Participants (%)
Myopia (SER ≤ -0.50 D)	2	1.0
Emmetropia (-0.50 < SER < +1.00 D)	34	16.4
Low Hypermetropia (+1.00 ≤ SER < +2.00 D)	120	58.0
Moderate Hypermetropia (+2.00 ≤ SER < +3.00 D)	38	18.4
High Hypermetropia (SER ≥ +3.00 D)	13	6.3
Total (n)	207	100

Amblyopia and ocular pathology

Amblyopia was found in four (1.9%) children, all due to refractive error, and two (1.0%) were referred to the specialist health service: one had intermittent exotropia, and one had suspected optic disc oedema. None of the other children showed any sign of ocular malformations or external abnormalities.

Quality of the vision screening

All children with amblyopia or suspected pathology were identified by the vision screening program at the CHC. However, 40.5% (n = 111) of children did not pass the VA criteria at the vision screening even though they did not have amblyopia or suspected pathology.

To investigate if the vision screening could reliably detect all the children in need of management, this study calculated sensitivity and specificity for those who were prescribed glasses, follow-up, or referral following the NCOVE examination. True positives (TP, n = 33) were defined as children who failed the screening and were also found by the NCOVE examination to require treatment (glasses, follow-up or refer). False positives (FP, n = 65) were defined as children who failed the screening but could be discharged without any treatment. True negatives (TN, n = 92) were defined as children who passed the screening and could be discharged without any treatment, whereas false negatives (FN, n = 20) were defined as children who passed the screening but who were found by the NCOVE examination to require treatment.

Sensitivity and specificity including confidence intervals were calculated. Sensitivity of the vision screening program at the CHC was found to be 62.3%, 95% CI [55.6, 68.9], and specificity was 58.6%, CI [53.0, 64.2].

Treatment

The clinical assessments by the specialist health service (ophthalmologist and orthoptist) confirmed most of the clinical judgements made by the optometrists. There was agreement on whether children should be discharged or be given any kind of management in 80.3% of cases between the optometrists and the ophthalmologist, and in 81.7% of cases between the optometrists and the orthoptist.

The percentage of children considered not to require treatment was similar for the optometrists and the ophthalmologist (75.6% and 76.5%, respectively), while it was slightly lower for the orthoptist (71.0%). The percentage of children considered to require glasses was highest for the optometrists (8.5%), followed by the orthoptist (6.7%) and the ophthalmologist (3.8%). The percentage judged to require follow-up was highest for the ophthalmologist (19.2%) followed by the optometrists and orthoptist (14.6% and 17.7%, respectively). The decision to refer

to specialist health service was most prevalent for the orthoptist (6.7%), while it was similar for the optometrists and ophthalmologist (1.4% and 0.5%, respectively). The optometrists and the orthoptist were more likely to prescribe glasses than the ophthalmologist, whereas the ophthalmologist was more likely to prescribe follow-up examination (see Table 2).

Table 2: *Frequency of children by management category (no treatment, glasses, follow-up, and referral)*

	Treatment (% of participants)				
	No treatment	Glasses	Follow-up	Referral	Total
Optometrists	75.6	8.5	14.6	1.4	100
Ophthalmologist	76.5	3.8	19.2	0.5	100
Orthoptist	71.0	6.7	15.7	6.7	100

The children found to have amblyopia (n = 4), were prescribed glasses by all three eye care professions. The orthoptist would refer three of these children to the ophthalmologist, whereas both the optometrist and the ophthalmologist agreed that follow-up could be done by the optometrist. For the children with suspected pathology (n = 2), all three eye professions agreed that referral to an ophthalmologist was the correct management.

For the children that were discharged after the NCOVE examination with no further management planned (n = 160), the ophthalmologist recommended prescribing glasses to one child, and follow-up for 16 children. The orthoptist recommended follow-up for 20 children. Thus, there was agreement in 89.4% of cases between ophthalmologist and optometrists and in 87.5% of cases between orthoptist and optometrists.

Discussion

This study found that vision screening at the CHC reliably detected children with amblyopia and suspected pathology, thus the screening fulfilled its purpose given by the national guidelines.

The screening was moderately sensitive in detecting children who required glasses or follow-up of their vision due to refractive errors. This means that not all children with the need for glasses or follow-up will be detected by the mandatory vision screening programme for 4–5-year-olds. Specificity was moderate, due to a fairly high number of false positives, and, hence, a substantial proportion of children would be unnecessarily referred to specialist health professionals. Based on the calculated sensitivity and specificity, this study cannot conclude that vision screening in its current form is reliable in detecting refractive errors. This is in line with current opinions and summaries in the area (Evans et al., 2018; Jonas et al., 2017).

There was a considerable difference between the VA measurements performed by the school nurses compared to the paediatric optometrists. This is not surprising, given the fact that optometrists are trained to perform VA testing and that paediatric optometrists are particularly experienced in performing this test even in young children. The fact that there was no proportional bias in the measurements suggests that the school nurses report variable results. This may be because several school nurses were involved in data collection, and their individual approach may have varied. Nevertheless, that results from the VA testing vary with the professional's experience have been documented by others (Nisted et al., 2019), and this finding supports the opinion that normative population based studies should use eye care professionals when measuring VA. VAs measured by the optometrists in this study were poorer than those found in a study from Denmark in a similar population (Sandfeld et al., 2018). However, in the Danish study VA was measured at a shorter distance (3 m instead of 6 m), which offers an explanation to better VA results. Even though the size of the optotypes is scaled to the distance, and hence angular size would be the same for the two distances, it has been reported that visual acuity in children can be dependent of test distance, thus a shorter distance can result in better measures (Rozhkova et al., 2005). Also, in the study from Denmark, Kay Pictures were used, which have been shown to result in better VA measurements compared to Lea Symbols (Anstice et al., 2017).

Strabismus was present in 0.5% of the children, which is slightly lower than expected. Previous studies have reported a prevalence of strabismus in 4–5-year-olds of 2.4% in Bradford, United Kingdom (Bruce & Santorelli, 2016), and of 3.3% in white Caucasian and 2.1% in African American children aged 6–71 months in the greater Baltimore area in the USA (Friedman et al., 2009). Amblyopia was found in 1.9% of the children, which is similar to previous reports (Friedman et al., 2009). Seven children did not participate in the study because they were already being managed by the eye care services. Vision status in these children is unknown, but it is likely that some of these have been diagnosed with strabismus and amblyopia at an earlier age.

Ocular pathology is rare in this age group. Recently, a report from the United Kingdom presented data from 5706 children aged 4–5 years screened by orthoptists, and here only four (0.07%) children had ocular pathology (Horwood et al., 2021).

Most children in this study had hypermetropia of +1.00 D or higher. The frequency of hypermetropia of +3.00 D and higher was 6.3% in this study, which is similar to a Danish study reporting hypermetropia in 7.9% of children around the age of 5.5 years (Sandfeld et al., 2018). Similarly, none of the Danish children had myopia of -0.5 D or lower, compared to only two in this study. It is expected that the ratio of hypermetropia to myopia is higher in younger age groups, but two studies have reported that a high percentage of hypermetropia is persistent in Scandinavian school children and adolescents: Falkenberg et al. (2019) found that in children aged 7–15 years who were referred from school vision testing, 51% were hyperopic (SER ≥ +0.50 D), 32% were emmetropic and 17% myopic (SER ≤ -0.50 D). Another Norwegian study in 16- to 19-years-olds found that more than 50% had hypermetropia (SER ≥ +0.50 D) (Hagen et al., 2018). These Scandinavian results contrast with studies from other parts of the world where the prevalence of hypermetropia is smaller (Dirani et al., 2010; Goh et al., 2005; He et al., 2009). This study adds to the established knowledge that hypermetropia is present in Norwegian children from an early age.

To the authors' knowledge, this is the first study to explore the agreement on diagnosis and treatment between eye care professionals for children in this age group. Previous studies in Norway reviewing relevance of optometrists' diagnoses and referrals to ophthalmologists have shown similar levels of agreement (80–85%), but these studies have included patients in all age groups (Lundmark & Luraas, 2017; Riise et al., 2000). Further, this study establishes that collaboration between professions is possible and useful using a digital communication tool. The high level of agreement between the different eye care professions is encouraging. Here, all eye care professionals had clinical experience in testing young children, and there were predefined criteria following international clinical guidelines for prescribing corrective lenses (Leat, 2011). Still, there was some disagreement between professions with regards to prescribing glasses and follow-up. This discrepancy may be due to a small number of children having borderline refractions for requiring glasses according to the guidelines and thus affecting clinical judgment. There was no disagreement on the cases with suspected pathology or amblyopia.

The participation rate was high throughout the study period and the population is similar to the rest of Norway, but generalising these results to a wider population cannot be done without

further consideration. It is possible that the proportion of children not participating may have contributed to the distribution of amblyopia, strabismus, or significant refractive errors. Inclusion of those not participating because they were already in the specialist health system may have skewed the distribution towards slightly higher frequencies, while the remainder not participating may or may not have vision anomalies. Hence, it is impossible to speculate on a possible change in outcome. However, VA in the non-participation group at the CHC was better than in the group participating, and relatively more children passed the screening criteria. Another possible explanation is that their parents chose not to participate because they were reassured that their child's vision was normal from the screening at the CHC. Taken together, this study sample is representative for Norwegian children aged 4–5 years.

In this study, vision screening of 4–5-year-old children by nurses at community health centres reliably detected children with amblyopia and most children with refractive errors. The digital communication tool used in this study enabled the paediatric optometrists to manage all children referred from the community health centres. The optometrists prescribed the appropriate treatment (glasses or follow-up) and referred the children to specialist health services when necessary. Even though the study showed that most children in this age group do not need glasses or further treatment, it confirmed, importantly, that most children can be managed by optometrists. Using paediatric optometrists as the referral body for the community health centres has the potential to relieve the specialist eye health service and ensure that children may receive treatment faster. A digital communication tool as used in this study can improve the accessibility to eye care for children.

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Evaluering av synsscreening av barn og digitale henvisningsrutiner i et tverrprofesjonelt samarbeid i Norge

Sammendrag

Godt syn er svært viktig for normal utvikling, og det å sikre god synsfunksjon hos barn er ett av FNs bærekraftsmål. De fleste land har synsscreeningsprogram for barn, og i Norge utføres synsscreening av barn i alderen 4–5 år ved helsestasjoner i kommunene. Spesialisthelsetjenesten ved oftalmologer og/eller ortoptister er henvisningsinstanser. Tilgangen til disse tjenestene kan imidlertid være begrenset og langt unna barnets hjemsted, mens optikere ofte er lokalisert nærmere og er mer tilgjengelige. Formålet med denne studien var å undersøke om synsscreeningen avdekker synsfeil, og å finne ut om bruk av optikere som henvisningsinstans kan avlaste spesialisthelsetjenesten. Studien ser også på forekomsten av brytningsfeil i denne aldersgruppen og videre håndtering av barna. Av de 274 barna som var på synsundersøkelse ved helsestasjonen i Kongsberg, Norge, samtykket foreldrene til 213 (77,7%) barn til full synsundersøkelse utført av en optiker med særskilt kompetanse i synsundersøkelse av barn. Samsvar mellom resultatene fra helsesykepleier og optiker ble evaluert. En øyelege og en ortoptist vurderte journalene fra synsundersøkelsene hver for seg ved hjelp av et digitalt kommunikasjonsverktøy (Eyecheck System AS) og samsvar i diagnoser og behandlingsbeslutninger mellom optiker og spesialisthelsetjeneste ble evaluert. Amblyopi og øyesykdom ble funnet hos 1,9% av barna, og disse ble identifisert ved synsscreeningen. Synsscreeningen hadde en sensitivitet og spesifisitet på henholdsvis 62,3% og 58,6% for å oppdage andre synsfeil som trenger behandling eller oppfølging. Hypermetropi var til stede hos 82,7% av barna (58,0% lav, 18,5% moderat, 6,5% høy hypermetropi), 16,4% var emmetrope og 1,0% var myope. Briller ble foreskrevet til 8,5% av barna, og 16,4% ble satt opp til oppfølgingskontroll. Det var høy grad av enighet om behandling mellom optikerne og spesialistene (oftalmolog 80,3%, ortoptist 81,7%).

Synsscreeningen avdekket amblyopi og øyesykdom, samt de fleste synsfeil som trenger behandling eller oppfølging. Den høye graden av samsvar mellom de tre øyehelseprofesjonene tyder på at optikere med særskilt kompetanse i synsundersøkelse av barn kan være henvisningsinstans for denne aldersgruppen. Tilgjengelighet av digitale kommunikasjonsverktøy gir god støtte til optikerne i beslutningstakingen og kan bidra til å avlaste spesialisthelsetjenesten ved å gi barna en synsundersøkelse og synskorreksjon tidligere og på en enklere måte.

Nøkkelord: synsscreening, barn, amblyopi, hypermetropi, brytningsfeil

Valutazione dello screening visivo pediatrico e delle routine di invio digitale al medico in un contesto interprofessionale in Norvegia

Riassunto

La visione è cruciale per lo sviluppo infantile e garantire una buona vista nei bambini è uno degli obiettivi di sostenibilità delle Nazioni Unite. Molti paesi hanno un programma di screening visivo infantile e, in Norvegia, lo screening nei bambini di età compresa tra 4 e 5 anni viene effettuato nei centri sanitari comunitari (CHC). I servizi sanitari specialistici come l'oftalmologia e/o l'ortottica sono le figure sanitarie di riferimento. Tuttavia, l'accesso a questi può essere limitato e possono trovarsi a grande distanza dalla casa del bambino, mentre gli optometristi sono spesso più disponibili e accessibili. Questo studio mira a indagare se lo screening visivo rileva in modo affidabile i problemi di vista e a esplorare se l'uso dell'optometria pediatrica come ente di riferimento può alleggerire i servizi sanitari specialistici. Lo studio mira anche a riportare la frequenza degli errori di rifrazione e la gestione dei problemi visivi in questa fascia di età.

Dei 274 bambini che hanno partecipato allo screening visivo effettuato dall'infermieria scolastica presso il CHC a Kongsberg, Norvegia, i genitori di 213 (77,7%) hanno acconsentito a un esame separato degli occhi e della visione effettuato da un optometrista pediatrico. È stato valuto il grado di accordo dei risultati dello screening fatto dalle infermiere scolastiche e dagli optometristi pediatrici. Separatamente, un oftalmologo e un ortottista hanno valutato i dati clinici degli esami visivi tramite uno strumento di comunicazione digitale (Eyecheck System AS), ed è stato valutato il grado di accordo nelle diagnosi e nelle decisioni di gestione tra optometristi e servizi sanitari specialistici.

Nell'1,9% dei bambini sono state riscontrate ambliopia o patologie oculari, tutti identificati dallo screening visivo. Lo screening visivo aveva una sensibilità e una specificità rispettivamnte del 62,3% e del 58,6%, nel rilevare altri problemi visivi che necessitassero di trattamento o follow-up. L'ipermetropia era presente nell'82,7% dei bambini (58,0% bassa, 18,5% moderata, 6,5% alta ipermetropia), il 16,4% aveva emmetropia e l'1,0% miopia. Gli occhiali sono stati prescritti all'8,5% dei bambini e al 16,4% è stato un appuntamento di controllo per follow-up. Il livello di accordo nella gestione tra optometristi e specialisti è considerabile elevato (oftalmologo 80,3%, ortottista 81,7%).

Lo screening visivo ha rilevato in modo affidabile ambliopia e patologia oculare, ed è stata rilevata la maggior parte degli errori di rifrazione. L'alto grado di accordo tra le tre professioni che afferiscono alla visione suggerisce che l'optometrista pediatrico può essere utilizzato come figura professionale di riferimento per questa fascia di età. La disponibilità di uno strumento di comunicazione digitale fornisce supporto agli optometristi pediatrici nelle loro decisioni e può aiutare a alleggerire i servizi sanitari specialistici fornendo ai bambini un esame oculare e una correzione visiva più precocemente e più facilmente.

Parole chiave: screening visivo, bambini, ambliopia, ipermetropia, errori refrattivi