

National Vision and Hearing Screening Protocols

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Introduction

The National Vision and Hearing Screening Protocols (National Protocols) describe the best practice requirements for Vision Hearing Technicians (VHTs) who are delivering the National Vision and Hearing Screening Programme.

The National Protocols provide an outline of the screening process, but are not a training manual. Personnel delivering this screening programme need to have attained or be working towards the NZQA National Certificate in Community Support Services (Vision and Hearing Screening) (Level 3) and comply with national competencies (refer to page 3).

This document should be read in conjunction with the appropriate National Service Specifications, which the Ministry of Health uses to purchase Vision Hearing Screening services from District Health Boards.

This document is in two sections:

Hearing screening protocols (pages 5–17)

Vision screening protocols (pages 18–35)

If you have any questions or queries about the National Vision and Hearing Screening Programme or this document, please contact the Well Child team at the Ministry of Health (well_child@moh.govt.nz).

Programme Summary

The programme

- Mass screening of a defined cohort of children (4 and 11 years old) to identify prevalent, undetected hearing problems and some undetected vision problems requiring further assessment and/or treatment.
- Targeted and follow up screening of groups at high risk and/or who have missed earlier screening events.
- Screening carried out by qualified personnel using appropriate equipment/tools in specified environments.
- Referrals to appropriate agencies using identified pass/fail criteria for screening.
- Documentation of results and reporting of statistical information.

Cohort groups

3 years

- At individual DHB's discretion, targeted tympanometry screening of groups at high-risk of harm from glue ear.

4 years (B4 School Check)

- Distance visual acuity screening used to detect children likely to have amblyopia.
- Screening audiometry (and tympanometry if required).

New entrants and Year 1 children (5- and 6-year-olds)

- Catch up screening for children who have not had B4 School Check screening as above, or need follow up tests from B4 School Check.

Year 7 (11-year-olds)

- Distance visual acuity screening to detect children with myopia or other conditions causing reduced acuity.
- Ishihara colour vision screening for boys.

Children in special circumstances and migrant children

- Screening audiometry/threshold audiometry depending on the age/ability of the child.
- Distance visual acuity screening to identify children with possible amblyopia depending on the age/ability of the child.

Test environments/locations

- Registered pre-school/early childhood education centres and kohanga reo.
- Community venues including churches, marae and community halls.
- State/private primary schools.
- State/private intermediate schools.
- Defined clinic settings.
- All environments are to comply with National Protocol requirements for light and sound levels or the VHT must make arrangements to use the environments at times when compliance is achievable.

Competencies

Personnel who provide vision and hearing screening services must have attained or be working towards the National Certificate in Community Support Services (Vision and Hearing Screening) (Level 3) and:

- be employed for a minimum of 16 hours per week for vision and hearing screening work
- receive ongoing professional development relevant to the screening processes specified in the National Protocols and attend the annual Training Seminar (at least biennially)
- have a biennial review/assessment of their competence
- have completed training in the Ministry of Education's ENROL database and the Ministry of Health's B4 School Check database.

Where personnel provide either vision screening or hearing screening alone, they still must meet the above employment/experience/review/training requirements.

Registered nurses and other health professionals carrying out vision and hearing screening do not need to be dedicated to vision and hearing screening for 16 hours per week but must meet all other competency requirements.

Test equipment

- Calibrated (annually) screening audiometer (0.5 kHz to 6 kHz @ 0–100 dB presentation range) fitted with noise-attenuating audiocups.
- Calibrated (annually) screening tympanometer (+200–400 daPa range).
- Parr letter-matching chart (with and without confusion bars) or an equivalent Sheridan Gardner chart.
- Snellen-ratio letter chart.
- Ishihara pseudoisochromatic plates for colour deficiency (24-plate edition).
- Black eye patch (tie-on or elasticised).
- Hand-held eye occluder (Denver model or similar).

- Sound level meter.
- Light level meter (illuminance meter, lux meter).
- Alcohol wipes, handrub and Milton solution.

Quality requirements

- Standard consent process prior to screening.
- Standard format for feedback of screening results to parent/caregiver of each child post-screening.
- Standard format of recording results onto the relevant national database to enable national reporting.
- Ministry of Health requirements as specified in the relevant National Service Specification and the National Protocols.

Hearing Screening

The hearing screen of four year olds is part of an overall framework of hearing screening and Well Child/Tamariki Ora hearing surveillance. This screen follows Universal Newborn Hearing Screening (UNBHS) shortly after birth and the intervening Well Child/Tamariki Ora checks.

The screening protocol is designed to identify hearing loss that is likely to interfere with normal speech, language development and learning, and to find children with persistent middle ear disorder that also causes a significant hearing loss. This screen is also designed to target, detect and refer children where there are hearing-related developmental/learning difficulties (referred to as risk factors), so that appropriate intervention can be provided prior to or early in a child's primary education.

If the child's hearing loss has already been confirmed as part of UNBHS or other Well Child/Tamariki Ora surveillance and the child is already under the care of an audiologist/wearing hearing aids, etc, it is not necessary to carry out screening audiometry.

Who to screen and which screening methods to use

Pre-school children (4-year-olds) B4 School Check

Pre-school screening is carried out in early childhood education centres or clinic settings. Screening audiometry and tympanometry (if required) are the screening tests to be administered. The results and outcomes (ie, pass, refer or re-screen) from this screen must be recorded in the B4 School Check database. If it becomes possible, the results will be transferred into the Ministry of Education's ENROL database.

New Entrants and Year 1 children (5- and 6-year-olds)

This screening is to capture the cohort of children who have not been screened as preschoolers or who need a follow-up test as a result of earlier screening. The same screening methods should be used as described above.

Older school-aged children on request and children new to New Zealand

In situations where there is concern about hearing from parents, teachers, and others in an older primary school aged child, a threshold audiometric test may be requested. Children that are new to the country also require screening unless there is already a documented hearing loss and the child is receiving care. In these situations the screen should be a full audiogram from 500 Hz to 6000 Hz. People requesting a screen should be informed that screening is not a full diagnostic hearing assessment, and a child should be referred to their GP/ear nurse/audiologist if there are any concerns. The results and outcomes (ie, pass, refer or re-screen) from this screen must be recorded in the ENROL database.

Consent

Although VHTs are still covered by Section 125 of the Health Act (1956), most regions have now implemented a consent process to encourage parents to make informed choices about their child's health. In addition, the recording of results in the national B4 School Check database requires the informed consent of parents. Therefore, all services delivering vision and hearing screening should implement an opt-off consent process. Section 125 should only be used in exceptional circumstances where the school or health services have concerns for a child's welfare.

The consent process should include information for parents about what their child is being screened for and questions about whether the child is already under the care of an audiologist or ear, nose and throat specialist and/or has grommets or a hearing aid.

Setting for hearing screening

It is important that the VHT obtains a suitable room for hearing screening. Inappropriate conditions may compromise the validity of screening. A range of setting may be used for hearing screening, according to local availability. The conditions discussed below apply to community settings, as well as clinic settings.

Type of room

The room in which the hearing screening takes place must:

- be quiet and free of distractions
- have soft furnishings and floor coverings to absorb noise.

In a school or preschool, the most suitable room is usually the school library or an office.

Minimise ambient noise

The degree of ambient noise in the room in which the hearing screening will take place must be less than 50 dB. Check the ambient noise with a sound level meter at the beginning of the screening session and at any other time you consider it necessary. Alternatively the screener (who must have normal hearing) can check that they are able to hear the test tones at 10 dB.

If the noise level exceeds 50 dB, speak to the staff and ask for noise levels to be reduced. Use a standalone sound-absorbing screen and approved noise attenuating headset cups in noisier environments to achieve the required noise attenuation. If appropriate background levels cannot be obtained do not continue with the testing as the results are likely to be invalid.

Venue organisation

Prior to visiting an early childhood centre or school you should:

- notify the venue of your intended visit and asked to plan quiet activities for when hearing screening is being carried out
- obtain the list of children requiring screening, eg, ENROL, preschool attendance lists
- ensure the consent process with parents has been completed.

Frequency of visits

Venues should be visited at least three times each year to ensure that all children are screened and re-screens can be done in a timely fashion. This may not always be possible in very small remote rural areas. In these cases, serial testing could be carried out in a scheduled clinic setting.

Service promotion

Wherever possible, VHTs should take the opportunity to promote understanding of the screening programme. It is important that parents and teachers appreciate the limitations of screening services. Speaking to school staff during morning tea/lunch breaks or at staff meetings is recommended. Information pamphlets or posters in the school are also encouraged.

Information for educators to help them understand vision and hearing screening is currently being developed. VHTs will be notified when this information is available for use. This information will be available online at the Ministry of Health website, and VHTs can print copies for distribution to preschool and school teachers, principals and other educators.

Equipment needed for hearing screening

To screen a child's hearing you need:

- an audiometer, tympanometer and ancillary equipment
- an appropriate chair and a table or desk on which to set up the audiometer and paperwork
- a set of record sheets
- a sound level meter
- headphones
- pegs and a container
- a chair for the child being screened.

Audiometers and tympanometers need to be calibrated regularly. A basic calibration shall be performed at least **yearly** by an independently audited laboratory with full traceability to National Standards (IANZ). Headphones are calibrated to a particular audiometer and so are **not** interchangeable.

Hygiene protocols for hearing screening

Audiometry

Hearing screen involving the placement of ear phones onto a child's ears. (NOTE: Audiometry should not be performed on children with discharging ears, or where the ear or surrounding skin is inflamed or broken.) These children need referral to the GP or ear nurse.

Procedures

Back at base – Check earphones regularly. If cleaning is required, carefully remove rubber cushions from earphones and wipe with warm soapy water. Ensure cushions are totally dry before replacing. (NOTE: If earphone cushions become cracked or porous they must be replaced to maintain hygiene).

Tympanometry

Middle-ear screens involving the placement of rubber tip at the opening of ear canal. (NOTE: Tympanometry is not performed on children with discharging ears, or where the skin is broken or inflamed).

Procedures

During screening – Change to a clean, unused rubber tip between each child screened.

Back at base – Ensure all used tips are wiped clean and any debris (eg, ear wax) removed, then place in the dish of Milton solution. The tips should be totally submerged in the solution so that all surfaces are covered. After soaking period, (manufacturer's recommendation) the tips should be left to drain onto clean absorbent tissue. When dry, they should be stored in their covered containers.

Personnel

Where VHTs have cuts or abrasions of the skin that may be susceptible to infection (ie, to the hands) it is advisable to wear disposable plastic gloves. Regular hand washing during screening is recommended. Where there is no access to a hand-basin, a topical antibacterial solution handrub or similar is suitable.

Suggested cleaning products

Milton solution tablets are acceptable for cleaning tympanometer tips (or similar antiseptic solution). The solution must be mixed according to the manufacturer's recommendations. The solution must be changed daily.

Alcohol swabs: 2 ply – medium grade (saturated with 70% isopropyl alcohol) in sterile individual packages.

Handrub: Microshield handrub (containing chlorhexidine gluconate 0.5% w/v in 70% v/v ethanol) or similar.

After the screening test

Notification to parents

Parents should be notified after every screen by using the nationally consistent parent feedback form.

Pass and refer brochures for hearing screening are currently being developed. These will be distributed to VHTs for use with all four and five year olds screened.

Follow up

Local records must be kept of all children who have been screened including:

- those who have passed
- those requiring a re-screen
- those who have been referred.

Parents/GPs/audiologists/ear nurses are asked to inform the referrer of their findings and proposed treatments. This information is recorded for future reference.

If no feedback information has been received from the referral, a follow-up letter or phone call to the family may be required to see if any action has been taken. If this is unsuccessful then the case should be referred to the Public Health Nurse Services or Community Health Team to initiate a home visit. This information must be recorded for future reference.

Where a child has already been assessed and determined as needing hearing aids or another assistive device (eg, hearing aids, cochlear implants, FM systems) but is not wearing them, or where a child failed to attend a Hospital audiology clinic appointment, the school's nurse/public health nurse should be informed. No further screening is warranted.

Preschool and school recording systems

There are two national databases for recording hearing results:

- Ministry of Education's ENROL database
- Ministry of Health's B4 School Check National Information System.

The entry of hearing screening results is required to meet the national reporting requirements for hearing screening, including the B4 School Check. The default system for entering the hearing screening results is the B4 School Check database. Transfer of results to the ENROL system will be done centrally.

Funding for services

Parents of children under 18 who are eligible for health services with hearing problems are *not* asked to pay for audiological services, habilitation services or assistive devices. These costs are funded by the Ministry of Health and the Ministry of Education.

Screening Technique – Screening Audiometry

The procedure for screening audiometry is based on the American Speech-Language-Hearing Association screening guidelines (ASHA 1997). The technique relies on a conditioned response to sound. The screen is difficult for children under three years of age. The success of the screen will depend upon achieving the conditioned response and this is described below.

The screen consists of presenting a tone at 40 dB at 1000 Hz initially, then reducing the level decibel level and screening across a range of frequencies.

Preparing the child for screening audiometry

Bring the child close to the audiometer (child must be no more than 30 cm from the headphones) and explain to the child that you will be playing a simple game. Tell the child that you will be making some sounds or beeps with the machine.

Leave the headphones on the desk with earphones facing toward child. Demonstrate with a 1000 Hz tone at 100 dB. Continue to explain to the child that to play the game the child must drop a peg into the container each time there is a beep. Demonstrate by dropping a peg into the container at the sound of a tone.

Present another 1000 Hz tone and drop another peg into the container, repeat this several times waiting between each beep so that the child understands that they must wait for the sound. Get the child to demonstrate dropping the peg at the sound of the tone. Ensure the child repeats this several times to show they thoroughly understand the task.

If the child is unable to sit still and participate, then they are not ready to be screened and will need to be put on a re-screen schedule. If there is concern, they should be referred to an audiologist for other screening techniques that are more appropriate for the child's developmental age.

Procedure for screening audiometry

IMPORTANT! Reduce the intensity level of the tone from 100 dB to 40 dB; the starting level for screening is 40 dB. Failure to reduce the sound level may cause pain or discomfort to the child.

Place the headphones on the child and present a 1000Hz tone at 40 dB in the right ear.

If the child responds decrease the level to 20 dB and test at 1000, 2000 and 4000 Hz. Then adjust the audiometer to 30 dB and administer the 500 Hz tone. If the child responds to all these tones, then test the left ear in the same way starting with the 500 Hz tone at 30 dB. Then reduce the intensity to 20 dB and continue with the left ear at 20 dB at 1000, 2000 and 4000 Hz. If the child hears all frequencies the result is a **pass**. Record the results and no further action is required.

If the child does not respond at 40 dB in the right ear initially, change to the left ear and test at 40 dB, if the child does not pass carry out tympanometry. This result is an immediate **refer**.

If the child responds at 40 dB in either ear and then does not respond at 20 dB at any frequency carry out tympanometry.

Referral pathways

Formal hearing screening as part of the New Zealand Well Child/Tamariki Ora schedule is undertaken at four years of age as part of the B4 School Check. This screen has three possible outcomes; a pass, re-screen or referral (a failure to meet the performance level considered acceptable on the occasion of the screening). Re-screens should be notified to the preschool and the parents and done as scheduled.

Pass, refer and re-screen criteria for screening audiometry

If audiometry screening levels of 30 dB at 500 Hz and 20 dB at 1000, 2000 and 4000 Hz are obtained in both ears, record the child's hearing test as a **pass**. No further action is required.

Audiometry screening levels between 20 and 40 dB (initial screen)

If the child is unable to hear the tone presented at 20 dB in either ear at 1000, 2000 or 4000 Hz, or 30 dB at 500 Hz, they should be offered a re-screen three months later unless there are concerns about speech/language, development or behaviour. Children who fail the initial screen with whom there are concerns about speech/language, development or behaviour should be referred to an audiologist.

- If a child is re-screened:
 - consider re-screening in a quieter location if there are concerns about ambient noise in the initial test environment
 - if the child is unable to hear the tone presented at 20 dB in either ear at 1000, 2000 or 4000 Hz, or 30 dB at 500 Hz, a tympanogram should be done
 - **refer** to audiology if the tympanogram is normal
 - **refer** to GP or ear nurse if the tympanometry is abnormal
 - where a referral is made to a GP or ear nurse the child's hearing must be screened again to rule out an underlying sensorineural hearing loss.

Audiometry screening levels above 40 dB at any test frequency

If the child is unable to hear the tone presented at 40 dB in either ear, record the result as refer and undertake tympanometry. If they pass tympanometry refer to an audiologist if they fail tympanometry refer to a GP or ear nurse. Where a referral is made to a GP or ear nurse the child's hearing must be tested again to rule out an underlying sensorineural hearing loss.

Child unable to participate

If the child makes inconsistent responses, suggesting that the child cannot perform the conditioned response and the child has no risk factors for developmental and language delay (see Table 1), re-screen the child in three months' time.

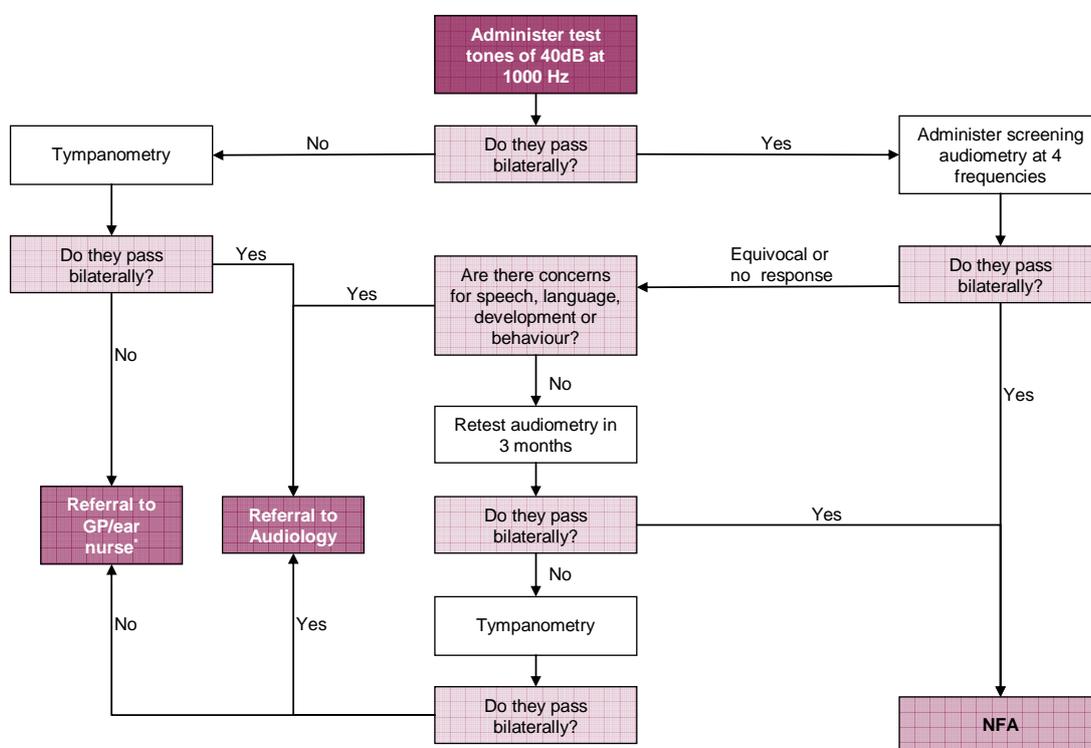
Recording of results for B4 School Check screening audiometry

The results and outcomes (ie, pass, refer or re-screen) for screening audiometry screening must be recorded in the B4 School Check database.

Table 1: Risk factors for hearing related developmental/learning difficulties

- Permanent hearing loss independent of otitis media with effusion. Provided these children have already been identified and are being cared for they should not be part of the screening programme but should be entered in the statistics.
- Suspected or diagnosed speech and language delay.
- Autism spectrum disorder or other pervasive developmental disorders.
- Syndromes (eg, Down Syndrome) or craniofacial disorders that include cognitive, speech and language delays.
- Blindness or uncorrectable visual impairment.
- Cleft palate with or without an associated syndrome.
- Developmental delay.
- Significant socioeconomic disadvantage.

Figure 1: Screening audiometry clinical pathway and referral criteria



* Where a referral is made to a GP or ear nurse the child's hearing must be screened again to rule out an underlying sensorineural hearing loss.

Screening Technique: Threshold Audiometry

A child's parent/caregiver or teacher may occasionally have concerns about a child's health, development, behaviour or learning and wonder whether a hearing problem is causing these symptoms or difficulties. Sometimes an older child will complain of hearing difficulties or hearing-related symptoms such as tinnitus or balance problems.

Threshold audiometry can be undertaken when an older child (five years or above) is referred with concerns about a possible hearing loss. This procedure is not a screening test, as it identifies a child's actual hearing thresholds. For that reason it should be undertaken in a quiet clinic environment, preferably in a sound-proofed room. Children under five years are likely to find threshold audiograms difficult, and few children under four years of age will be able to complete them satisfactorily. As a rule children under four years of age with suspected hearing difficulties should be referred to an audiologist for audiometry.

Procedure for threshold audiometry

The screen has two steps. The first step is to get the child familiar with the screening tone and once that is completed, the VHT should undertake the threshold measurement.

Familiarisation is undertaken to make sure that the child is able to reliably perform the response task. The child must be presented with a loud enough signal to evoke a clear response.

The method used for familiarisation by VHTs is as follows:

- Present a 1000-Hz tone at a 50 dB hearing level (HL). If a clear response occurs, move to threshold measurement. If no response occurs, increase the intensity by increments of 10 dB until a clear response is obtained.

Threshold determination

The threshold of hearing is defined as the lowest decibel hearing level at which responses reliably occur.

The tones to be used are 1–2 second duration pure-tone stimuli at 500, 1000, 2000, 4000 and 6000 Hz.

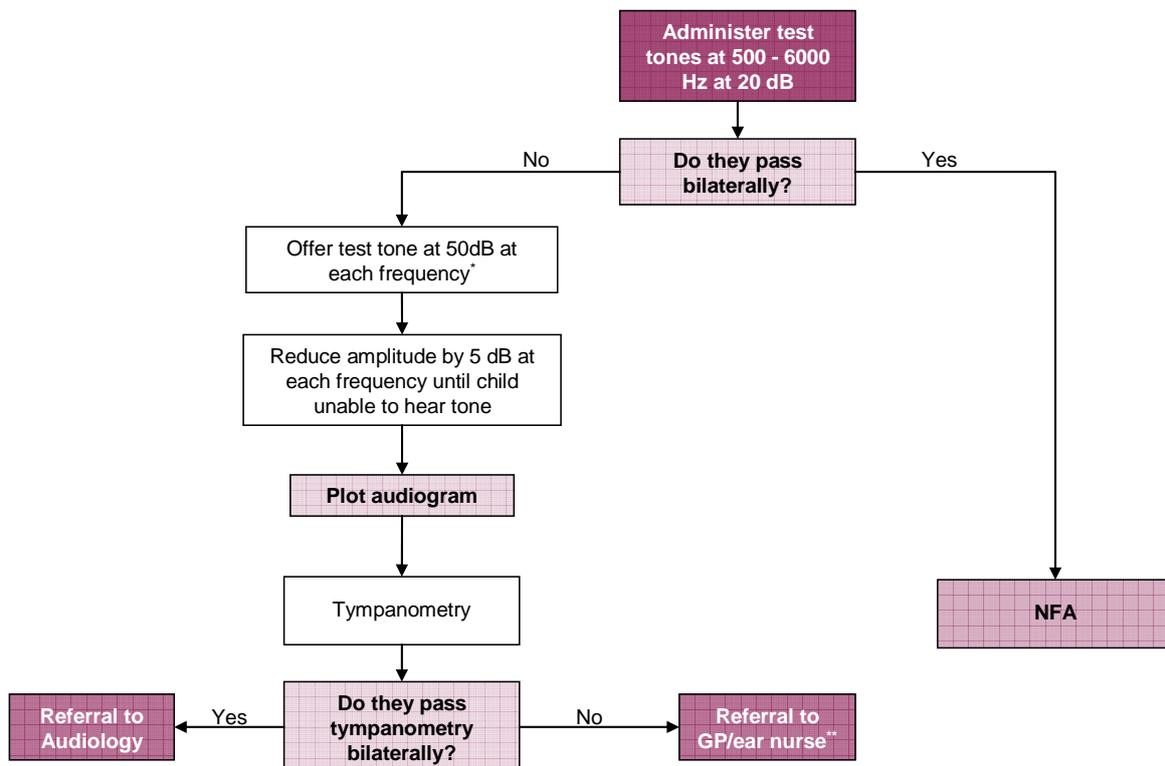
1. Start at 50 dB (or the child's response level if higher) and reduce intensity in 5-dB steps until the child fails to respond.
2. After a clear threshold is identified, move to the next frequency.
3. Enter results onto ENROL system.

Referral pathways

Following a parent, child or teacher initiated self-referral, the health practitioner consulted must work within their scope of practice to ensure that the family receives a timely high quality service.

- The VHT should screen hearing and middle ear pressures in the appropriate manner and setting for the child's age and development and refer to a GP or audiology clinic with the results of the threshold audiogram, tympanometry (if required) and any relevant observations of the child.
- A nurse (including an ear nurse) or GP should obtain a history, and undertake and record audiometry and tympanometry if the equipment is available, and the practitioner is experienced. They should undertake a clinical examination of the external ear, ear canal and tympanic membrane and other appropriate examination of the child, and make a referral or institute management if required.
- An audiologist should obtain a history, examine the external ear, ear canal and tympanic membrane, undertake and record an audiogram, including air and bone conduction, measure immittance and middle ear pressures, and conduct all other assessments necessary to determine a diagnosis. The audiologist should make a referral or institute management if required and appropriate.

Figure 2: Threshold audiometry clinical pathway and referral criteria



* If no response occurs, increase the intensity by increments of 10 dB until a clear response is obtained.

** Where a referral is made to a GP or ear nurse, the child's hearing must be screened again to rule out an underlying sensorineural hearing loss.

Screening Technique: Tympanometry

Tympanometry is not required for children with grommets

Children with patent grommets are likely to have an abnormal tympanogram. Before the tympanometry screen, parents should be asked as part of the consent process whether the child has grommets. If the child has grommets, no further action is required.

Settings for tympanometry

Tympanometry screening will be carried out in the same setting as screening audiometry and therefore must:

- be quiet and free of distractions
- have soft furnishings and floor coverings to absorb noise.

Equipment

A table is required to set up the equipment and paperwork, and appropriate lighting to read results on the screen. An appropriately sized chair is also essential for health and safety requirements.

Preparing the child for tympanometry

Follow these steps to prepare the child for the tympanometry screen.

1. Stand the child in front of you, and explain that you will be using your 'special camera' to take a measurement/picture of their ears.
2. Show the child the tympanometer screen to reassure them, liken it to a small TV.
3. Tell the child they will need to stand still for just a minute while you take the picture.
4. When you feel the child understands and is ready, begin the procedure.

Procedure for tympanometry

Follow these steps to undertake the tympanometry screen.

1. Turn the child so that their right ear is facing you.
2. Place the tympanometer probe in the child's ear and run a screen.
 - If the screen result is pass, record the result. Go to step 4.
 - If the screen is abnormal, go to step 3.
3. Repeat the test.
 - If the result is a pass, record the result. Go to step 4.
 - If the result is abnormal, record the result including the physical volume measure. Go to step 4.
4. Turn the child so their left ear is facing you.

5. Place the tympanometer probe in the child's ear and run a screen.
 - If the screen result is a pass, record the result. End of procedure.
 - If the screen is abnormal, go to step 6.
6. Repeat the screen.
 - If the result is pass, record the result. This is the end of the procedure.
 - If the result is abnormal, record the result including the physical volume measure. This is the end of the procedure.

Referral pathways

Pass, refer and re-screen criteria for tympanometry screening

Children who are having tympanometry must have first had audiometry screening. Normal audiometry (ie, bilateral pass responses) means no further screening needs to be done. The procedures below all follow an abnormal screening test.

Tympanogram is normal

If screening test is abnormal and the tympanogram is normal, the child may have a sensorineural hearing loss. In this situation refer the child to audiology for further assessment.

Tympanogram result cannot be obtained

If you are unable to gain a seal (ie, there is an air leak) when trying to run a tympanogram:

- record unable on the child's notes
- contact the child's parents to see whether the child has grommets
- if the child does not have grommets, refer the child to a GP or ear nurse for further assessment (note as a refer).

Tympanogram is abnormal

- If the tympanogram shows no peak and the physical volume measure is under 0.3 ml or over 1.5 ml, refer the child immediately to a GP/ear nurse.
- If the tympanometry result shows no peak (ie, it is a flat graph), and the physical volume measure is 0.3–1.5 ml, re-screen the child in three months' time.
- If a re-screen tympanometry result shows no peak, refer the child to a GP/ear nurse.
- Children with the conditions listed in Table 1 above are at high risk for developmental and learning difficulties, which otitis media with effusion is likely to exacerbate. If they fail their audiogram and have an abnormal tympanogram in either ear or both ears refer them straight away.
- Always ensure after referrals for failed tympanometry that a repeat hearing screen has been carried out, either by the screening programme or an audiologist to rule out underlying sensorineural hearing loss.

Recording of results for B4 School Check tympanometry screening

The results and outcomes (ie, pass, refer or re-screen) for tympanometry screening must be recorded in the B4 School Check database.

Vision Screening

The prevalence of visual deficits in the preschool population is estimated to be 10–15 percent (Feightner 1998). Treatment for amblyopia, the focus of the vision screening, is most beneficial if started before the child starts school. Amblyopia can lead to permanent vision loss in one eye if not treated early.

Who to screen and which screening methods to use

If you, a teacher or a parent/caregiver has concerns about a child's vision or eyes, initiate a full assessment with an ophthalmic professional.

If the child is currently under the care of an ophthalmic practitioner, a screening test is unnecessary, whether the child wears glasses or not.

Preschool children/B4 School Check (4-year-olds)

Preschool vision screening is carried out in early childhood education centres/clinic settings. The four metre Parr letter matching charts (WITH confusion bars) or the equivalent four metre Sheridan Gardner letter matching charts are the screening tests which are to be administered. The results and outcomes (ie, pass, refer or re-screen) from this screen must be recorded in the B4 School Check database. Plans are in place for this information to be transferred to the ENROL database for access by educators.

Vision screening of new entrants/Year 1 children (5- and 6-year-olds)

Vision screening at this age is to capture the cohort of children who have not been screened as preschoolers or who need a follow up screen as a result of earlier screening. Again, the four metre Parr letter matching charts (WITH confusion bars) or the equivalent Sheridan Gardner charts are to be used.

Year 7 children (11-year-olds)

Year 7 vision screens are carried out within the child's first year of intermediate schooling. The Snellen-ratio vision chart is to be used. Boys in this age group are also examined for colour vision defects using Ishihara pseudoisochromatic plates. The results and outcomes (ie, pass, refer or re-screen) from these screens must be recorded in the ENROL database.

Older school-aged children on request and children new to New Zealand

In special circumstances, parents, teachers, and others may request a vision screening for a particular child. Children new to the country also require screening. The type of screen administered depends on the child's age and ability – using the above screen recommendations as a guide. People requesting a screen should be informed that vision screening is not a full assessment, and a child should be referred to a vision professional if there are any concerns. The results and outcomes (ie, pass, refer or re-screen) from any additional screenings must be recorded in the ENROL database.

Consent

Although VHTs are still covered by Section 125 of the Health Act (1956), most regions have now implemented a consent process to encourage parents to make informed choices about their child's health. In addition, the recording of results in the national B4 School Check database requires the informed consent of parents. Therefore, all services delivering vision and hearing screening should implement an opt-off consent process. Section 125 should only be used in exceptional circumstances where the school or health services have concerns for a child's welfare.

The consent process should include information for parents about what their child is being screened for and questions about whether the child is already under the care of a vision specialist and/or has glasses.

Setting for vision screening

Vision screening requires a room that is free of distractions and more than four metres long. The room should be uniformly and brightly illuminated. It should have a light level of at least 300 lux in the room with about 500 lux to illuminate the test chart. If you are unsure whether the lighting is sufficient, carry out a formal light meter test.

Venue organisation

Prior to visiting an early childhood centre or school you should:

- notify the venue of your intended visit and asked to plan quiet activities for when vision screening is being carried out
- obtain the list of children requiring screening, eg, ENROL, preschool attendance lists
- ensure the informed consent process with parents has been completed.

Frequency of visits

Venues should be visited at least three times each year to ensure re-screens can be achieved. It is acknowledged that this may not always be possible in very small remote rural areas. In these cases, re-screening could be carried out in a scheduled clinic setting.

Service promotion

Wherever possible, VHTs should take the opportunity to promote an understanding of the screening programme. It is extremely important that parents and teachers appreciate the limitations of the vision screening services. Speaking to school staff during morning tea/lunch breaks or at staff meetings is recommended.

Information for educators to help them understand vision screening is currently being developed. VHTs will be notified when this information is available for use. This information will be available online at the Ministry of Health website, and VHTs can print copies for distribution to preschool and school teachers, principals and other educators.

Equipment needed for vision screening

For vision screening, you need:

- 4 m Parr charts with and without confusion bars with key card (or equivalent Sheridan Gardner charts)
- 4 m Snellen-ratio chart
- occluding glasses or patch
- retractable 5 m ruler
- masking tape
- light meter
- chair for the child.

Hygiene protocols for vision screening

Screening involves the placement of a rigid plastic eye patch or hand-held eye occluder over child's eye. (NOTE: Vision screening is not performed on children with inflamed eyes, styes, or where the surrounding skin is broken or inflamed. These children should be booked for a re-screen at a later date).

Procedures

Option 1 – During screening – wipe rigid eye patch or hand held eye occluder with alcohol swab after each screen. Allow to dry completely before using on a child.

Option 2 – During screening – place a clean tissue under the eye patch when it is put on and replace the tissue between each child screened.

Back at base – Ensure eye patch and/or hand-held eye occluder is thoroughly wiped with alcohol swab and stored in a clean container.

Personnel

Where VHTs have cuts or abrasions of the skin that may be susceptible to infection (i.e. to the hands) it is advisable to wear disposable plastic gloves. Regular hand washing during screening is recommended. Where there is no access to a hand-basin, a topical antibacterial solution handrub or similar is suitable.

Suggested cleaning products

Alcohol swabs: 2 ply – medium grade (saturated with 70% isopropyl alcohol) in sterile individual packages.

Handrub: Microshield Handrub (containing chlorhexidine gluconate 0.5% w/v in 70% v/v ethanol) or similar.

After the screening

Notification to parents

Parents should be notified after every screen using the nationally consistent parent feed-back form. Children who pass the screen should receive the pass brochure, while those who are referred should receive the referral brochure and Spectacles Subsidy brochure.

Copies of the Spectacles Subsidy can be ordered through Enable NZ (phone 0800 17 1981). Printed copies of the Spectacles Subsidy brochure are available in a number of languages.

The pass and refer brochures are available from the Ministry of Health's Well Child team or the Ministry's website (<http://www.moh.govt.nz/moh.nsf/indexmh/childhealth-b4schoolcheck-parents>). These brochures are available in hardcopy in English and online in six other languages.

Follow up

Local records must be kept of all children who have been screened including: those who have passed, those requiring a re-screen, and those who have been referred. Parents/ophthalmologists/optometrists/orthoptists are asked to inform the referrer of the findings and proposed treatment. This information is recorded for future reference.

If no feedback information has been received from the referral, a follow-up letter or phone call to the family may be required to see if any action has been taken. If this is unsuccessful then the case should be referred to the Public Health Nurse Services or Community Health Team to initiate a home visit. This information must be recorded for future reference.

Where a child has already been assessed and determined as needing glasses but is not wearing them, or where a child failed to attend a hospital eye clinic/ophthalmologist/optometrist appointment, the school's nurse/public health nurse should be informed. No further screening is warranted.

Preschool and school recording systems

There is one main national database for recording vision results: The Ministry of Health's B4 School Check National Information System. The entry of vision screening results is required to meet the national reporting requirements for vision screening, including the B4 School Check. The Ministry of Health and the Ministry of Education are developing a process for transferring vision screening data into the ENROL database.

Subsidies for glasses/spectacles and eye exams

Children with vision problems, aged 15 years and under, who are in low income families may be able to get funding assistance for examinations, frames, lenses, eye patches and repairs. The child will need to have an assessment by a vision assessor who is registered as an assessor for this subsidy. The accredited vision assessor will assess a child's vision needs and may recommend glasses or other vision equipment. An accredited assessor is usually an optometrist, eye specialist, or a service co-ordinator for the Royal New Zealand Foundation of the Blind. Not all optometrists and eye specialists are accredited vision assessors. You should have an up-to-date list of accredited assessors.

There are brochures available for families to explain who is eligible for the subsidy. You can view this brochure and read further information at the Ministry of Health website. <http://www.moh.govt.nz/moh.nsf/indexmh/disability-fundedservices-glasses>

If the child requires a referral and their parent has a Community Services Card, advise the parent to contact Enable New Zealand to find a vision assessor in their area (phone 0800 17 1981).

Screening Technique: Parr Letter-Matching Charts or Sheridan Gardner Charts

The screening is conducted exactly four metres from the child and at the same level as the child's eyes. Measure four metres from the child with the tape measure, and mark the floor at both ends with a piece of masking tape. Note: The front legs of the child's chair may be ahead of the tape.

Ensure that the chart (book) and the key card match (ie, both have confusion bars), have a matte finish to ensure the child cannot see reflections and are free from marks such as fingerprints or pen ink. Make sure the child is not facing a window or other bright light source that could make the chart difficult for them to see.

Remember that although the screen is done at four metres the results (eg, 6/6 or 6/12) are written as though the test was undertaken at six metres. Do not record the results as 4/4 etc).

Preparing the child for Parr letter-matching charts / Sheridan Gardner charts

1. Seat the child so their eyes are level with the masking tape. Note: The front legs of the child's chair may be ahead of the tape.
2. Ask the child to hold the key card on their lap. Explain to the child that you will be playing a simple game.
3. Show the child a large letter shape from your book. Explain that they have to point to the shape that is the same on their card.
4. Help the child find the letter on their card. Demonstrate that they are the same.
5. Change the letter and again help the child to find the same letter.
6. When you feel the child understands the task, show the child the eye patch and suggest they need to be a 'pirate' to play the game.
7. Follow the procedure for the Parr letter-matching chart.

Procedure for Parr letter-matching charts / Sheridan Gardner charts

1. Place the eye patch over the child's left eye.
2. Move to the four metre point. Ensure no other children are sitting between you and the child being screened.
3. Beginning with the largest letter, show the child progressively smaller letters from each level. Encourage the child as much as possible. Continue until the child has difficulty identifying the letters.
4. Record the smallest letter size at which the child identified all letter shapes correctly. Use the conversion table on the back cover of the book.
5. Place the eye patch over the child's right eye.
6. Move to the four metre point.

7. Beginning with the largest letter, show the child progressively smaller letters from each level. Show the letters in a different order from that which you showed the child in step 3. Encourage the child as much as possible. Continue until the child has difficulty identifying the letters.
8. Record the smallest letter size at which the child identified all letter shapes correctly. Use the conversion table on the back cover of the book.
NB: 6/6, 6/6 is recorded when the child is shown all three 6/6 letters and can achieve two.
9. If the child has difficulty understanding the Parr chart WITH confusion bars, consider using the Parr chart WITHOUT confusion bars. *NB: In this case a pass is only achieved where 6/6 is achieved in both eyes. Children not achieving this should be re-screened (6/9 both eyes) or referred (worse than 6/9 either eye) with a note to the referrer that the Parr chart WITHOUT confusion bars was used.*

Referral pathways

Pass, refer and re-screen criteria for vision screening

Four-year-old children who have a visual acuity of 6/6 in one eye and 6/9 in the other should be re-screened within six months. This is because one eye may be improving or one eye getting worse. A re-screen will distinguish the two possible options.

Vision is 6/9 or better in both eyes at the B4 School Check

- The child's vision screening is considered a pass.
- Note the measurements of vision on the child's records.
- Take no further action.

Vision is 6/9 in one eye and 6/6 in the other at the B4 School Check

- Note the measurements of vision on the child's record.
- Arrange a re-screen for three to six months' time.

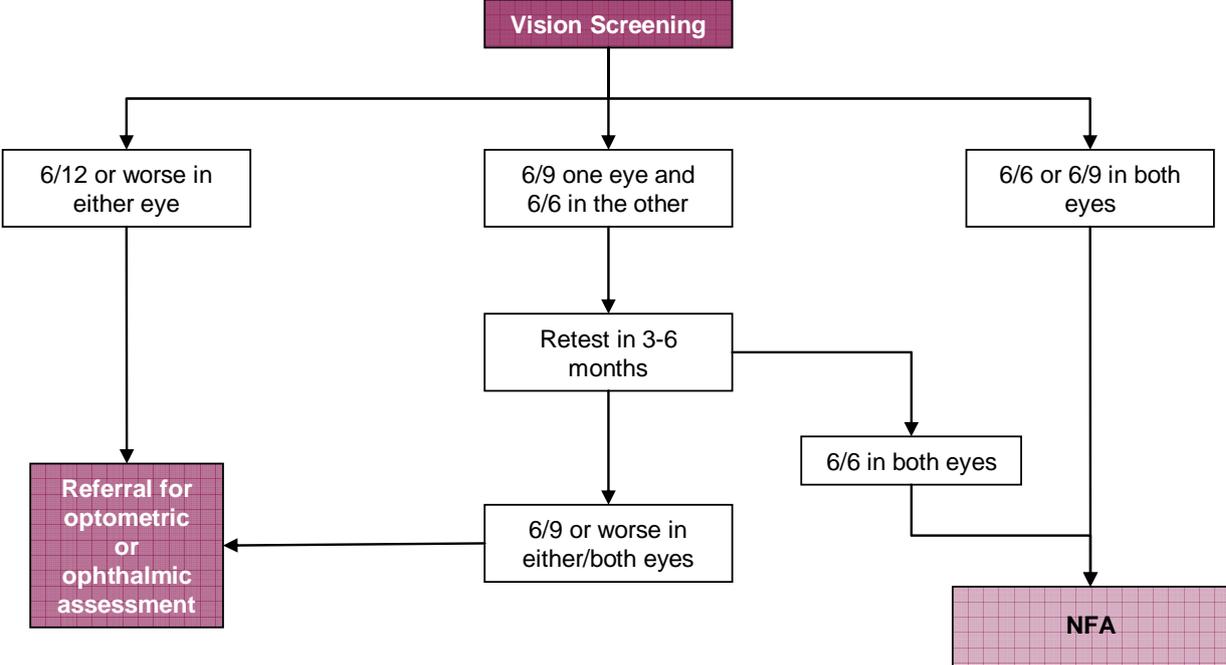
Vision is 6/12 or worse in either or both eyes at the B4 School Check

- Refer the child for further assessment according to the Ministry of Health's referral guidelines.

On re-screen

If the child's vision is 6/6 or better in both eyes the re-screen is considered a pass and no further action is required. If there is no change in the child's vision (ie, they are 6/9 in one eye and 6/6 in the other) or their vision has become worse in either eye (ie, they are 6/9 in both eyes, or 6/12 or worse in either eye) refer the child for further assessment according to the Ministry of Health referral guidelines.

Figure 3: Vision screening clinical pathway and referral at four years old



Screening Technique: Snellen Vision Chart

The screen is conducted with the Snellen chart exactly four metres from the child and at the same level as the child's eyes. Measure four metres from the child with the tape measure, and mark the floor at both ends with a piece of masking tape. Ensure that the Snellen chart has a matte finish to ensure the child cannot see reflections. Make sure the child is not facing a window or other bright light source that could make the chart difficult for them to see.

Preparing the child for Snellen vision screen

1. Stand the child behind the four metre mark, with their toes on the masking tape line.
2. Explain to the child that you will point to random letters on the chart and ask the child to identify each letter.
3. Ensure that the child knows the names of the letters.
4. Follow the procedure for the vision chart with the Snellen Vision screen.

Procedure for Snellen vision screen

1. Place the occluder in position with the child's right eye visible. Explain that the child is to hold the occluder in place until asked to move it.
2. Turn the eye chart over. Beginning with the largest letter, point to progressively smaller letters (two or three letters from each level is sufficient). Select letters randomly. Encourage the child as much as possible. Continue until the child has difficulty identifying the letters.
3. Record the smallest letter size at which the child identified all letters (ie, the whole line) correctly.
4. Ask the child to turn the occluder over, so their left eye is visible.
5. Turn the eye chart over. Beginning with the largest letter, point to progressively smaller letters (two or three letters from each level is sufficient). Select letters randomly and in a different order from that in step 2. Encourage the child as much as possible. Continue until the child has difficulty identifying the letters.
6. Record the smallest letter size at which the child identified all letters (ie, the whole line) correctly.

Referral pathways

If the child is under the ongoing care of an ophthalmic practitioner (an ophthalmologist or optometrist) and has been prescribed glasses:

- the child should not usually be screened
- if the child is screened, a referral is unnecessary no matter what the vision results are, but contact the parent or caregiver to provide them with the results and to make sure the child has had a recent vision examination.

Offer referral if concerns about child's vision

If at any stage, a teacher, parent or caregiver thinks the child has any vision or development-related problems, it may be necessary to refer the child for a comprehensive vision assessment (see referral guidelines). There should also be an offer of a referral for the child's eyes to be examined, as the screen does not cover some aspects of vision.

Caregivers presenting to a health practitioner with concerns about their child's vision

A child's caregiver or teacher may occasionally have concerns about a child's health, development, behaviour or learning and wonder whether a vision problem is causing these symptoms or difficulties. Sometimes an older child will complain of vision difficulties. Depending on the child's age, local services and parental preferences the initial presentation could be to a VHT, a nurse, an optometrist or a GP.

Following a parent, child or teacher initiated self-referral; the health practitioner consulted must work within their scope of practice to ensure that the family receives a timely high quality service as described below.

Health practitioner role

- The VHT should screen visual acuity in the appropriate manner for the child's age and development and refer onward if required with the results of the visual acuity screen and any relevant observations of the child.
- A nurse or GP should measure and record visual acuities, undertake a clinical examination of the eye, other appropriate examination of the child and make a referral or institute management if required.
- An optometrist should obtain a history, measure and record visual acuities, examine the external and internal structures of the eye, assess ocular motility, fusion, convergence, accommodation, pupil reactions, and conduct all other assessments necessary to determine a diagnosis. The optometrist should make a referral or institute management if required and appropriate.

Referrals

- In general infants and children under three years of age with visual acuity and other problems should be referred to an ophthalmologist for further assessment.
- In certain situations access issues and parental preferences may mean that an infant or child under three years is referred to an optometrist. Referrers should regularly consult with the New Zealand Association of Optometrists (NZAO) about optometrists available in their area who have appropriate training, experience and interest in seeing younger children.
- Children over three years of age with visual acuity abnormalities could be referred either to the ophthalmologist at a hospital eye clinic or to an optometrist.

Children failing a formal visual acuity screening

Formal vision screening as part of the New Zealand Well Child/Tamariki Ora schedule is undertaken at four years of age as part of the B4School check and at 11 years of age.

This screen has three possible outcomes; a pass, re-screen or referral (a failure to meet the performance level considered acceptable on the occasion of the screening).

Re-screens should be notified to the preschool and the parents and done as scheduled.

A four-year-old child who is referred from the vision screen with a visual acuity of 6/12 in either eye or a five- or an 11-year-old who is referred at 6/9 in either eye should receive further professional investigation.

There are three possible referral scenarios.

- 1 A four- or five-year-old child who has distance vision that is equally reduced in each eye or with less than or equal to two lines difference in the vision between the eyes could be referred to either an optometrist or an ophthalmologist, depending on practitioner availability or parental preference.
- 2 A four- or five-year-old child who has a difference in distance visual acuity between the eyes greater than two lines can be referred to either an optometrist or an ophthalmologist, depending on practitioner availability and parental preference.^{1,2}

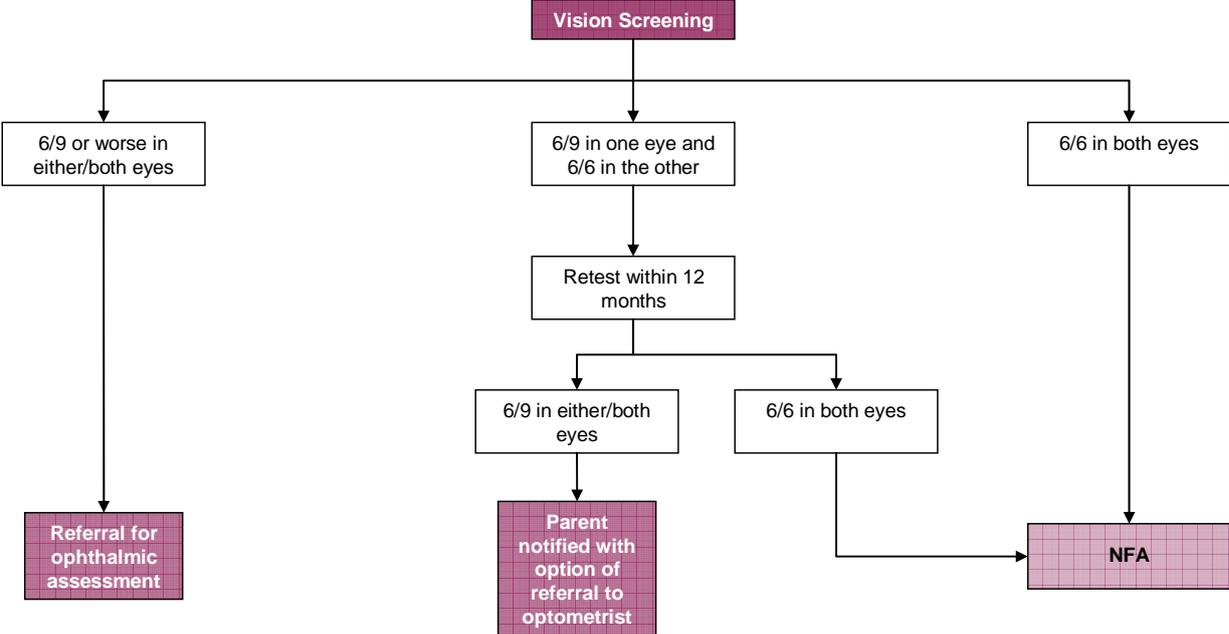
If a four- or five-year-old child with greater than two lines difference between the visual acuity in each eye is referred to an optometrist, referrers should consult with NZAO about optometrists available in their area who have appropriate training, experience and interest in seeing younger children.
- 3 An 11-year-old child who has distance vision that is equally reduced in each eye or where there is a difference in distance visual acuity of greater than two lines between the eyes can be referred to an optometrist.

The ophthalmologist at the hospital eye clinic or the optometrist to whom the child is referred should acknowledge receipt of the referral, and inform both the referrer and the child's GP of the outcome of the referral.

¹ In the opinion of the Royal Australasian and New Zealand College of Ophthalmologists these children should in general be referred to an ophthalmologist except if there are access issues or in line with parental preference.

² In the opinion of the New Zealand Association of Optometrists these children should be generally referred to an optometrist except where there is a parental preference to see an ophthalmologist.

Figure 4: Vision screening clinical pathway and referral at five years and older



Colour Vision: Ishihara Pseudoisochromatic Plate

Conditions

Illuminate with indirect daylight (do not use in direct sun). The light level must be 500–600 lux. The plate must be held about 75 cm (30") with the child's line of sight perpendicular to the page (if the test is held at a normal reading distance the visibility of the numbers is reduced and the test is more difficult because the coloured dots making up the numbers are more obvious). Make sure that no other child can see the screening or overhear the responses of the child you are screening.

Equipment

This screening uses the 24-plate edition of the Ishihara Test for Colour Deficiency. The Ishihara books must be replaced at least every seven years.

Procedure

Explain that you will be flipping through the pages of the book and asking the child to either identify the number or numbers on each page or to let you know if there is no number (some pages have no numbers). Reassure the child that there is no 'trick'. The order of the plates may be jumbled to eliminate learning effects.

Presentation

Make sure the child can identify the number on plate one correctly. Vision of better than 6/60 is required for this plate. Continue to present each of the test plates two through 17 (in the 24-plate edition), allowing approximately three seconds each plate and count the number of plates misread. Do not count as a fail if a child has self-corrected.

Where a single plate has two numbers on it, an error on either one or both numbers counts as a single error. Note the number of failed plates.

Ishihara colour vision screen (Ishihara pseudoisochromatic plate)

On the 24-plate edition if three or less errors are made, record as 'Colour Vision: Pass' on the child's records. The word normal is not used, as this is a screening test result only and is not a full colour vision assessment by an optometrist.

On the 24-plate edition if **more than three errors** are made on the number plates (2 to 17) then a colour vision defect is almost certain to be present. Record as 'Colour Vision: Defect'. The number of errors made on Ishihara is **not** a reliable estimate of the severity of any colour vision defect.

No referral is warranted, unless further diagnosis is required. The child and parents should be informed so they can discuss career options. Also if a colour vision defect is present then some educational methods, which use colour coding, can be compromised. There are no re-screen criteria for colour vision screening. A defect result warrants a notification to the parent.

Recording of Ishihara colour vision

The results of this screen must be recorded in the Ministry of Education's ENROL database.