Children and Their Eyes
what you NEED to know and DO!

Vision and visual functions in children develop rapidly over the first few months of life. By the time a child is 4-6 months old, detecting differences in contrast, colour, eye alignment, and the use of both eyes in a coordinated manner, are all quite advanced. The ability to see as clearly as healthy adults do, appears to be the last aspect to fully mature, and continues to home as the child grows and is normally complete by the age of about 8 years. "Does your toddler need glasses?" dealt with the importance of parents looking out for outward signs of eye problems in young children, some of which include:

- Sitting too close to the television or holding reading material too close
- Difficulty identifying and/or confusing colours
- Looking cross-eyed or "wall-eyed"
- Excessive blinking
- Difficulty following objects with both eyes
- Trouble moving one or both eyes in all directions
- Screwing up eyes to look at something
- One or both eyes tending to turn out or wander
- Eyes that flutter quickly from side to side or up and down
- Bulging eyes
- Eye pain, itching, or discomfort
- Redness in either eye that doesn’t go away in a couple of days
- Pus or crusting in either eye
- Eye(s) that are always watery
- Drooping eyelid(s)
- Excessive eye rubbing
- Eyes that are always sensitive to light
- Difficulty with eye-hand-body coordination

Of course children are more likely to have visual problems if eye problems run in the family, or if they are born prematurely or with a low birth weight.

New-borns will normally be checked before they leave hospital to ensure that their eyes appear normal and are working properly as part of their general physical examination. These will often include checks for proper eye alignment, for problems on the outside of the eye, pupil reactions to changes in light and clarity of the dark space and reflex within the pupil with a special light (ophthalmoscope). Later a medical doctor or health visitor may also carry out similar checks. However, these checks are limited and can’t be used to diagnose an eye or vision problem, but are used to indicate the potential need for further more detailed evaluation by an eye care practitioner.

In the absence of any disease or physical abnormality of the eyes at this early stage, the eyes will carry on developing normally and improve their ability to see clearer images in both eyes as the child grows. This developmental process, although variable somewhat from child to child, generally runs very smoothly for the vast majority of children. The end point for them is a well-developed ability to see clearly both in the distance and at near with each eye. However, for some, this growth progress to the "normal" end-point may not proceed properly in one or both of the eyes. It is in these children that the risk of visual difficulties is increased, and they may well require some intervention to prevent avoidable vision loss. Identified early and treated, such children will increase their chances of developing normal vision.

Growth to "normal"

Although eyes keep developing from birth until the age of about 8 years, the process of growth to "normal" is largely completed by 2 years. It is thus reasonable to consider a detailed eye examination at this age, certainly before starting school, and right away if the child shows any of the outward signs of eye problems stated previously. It is not necessary for pre-school children to know their alphabet. The level of vision during an eye examination can be established easily for each eye using special symbols and picture test types, specialist ophthalmic equipment and techniques that children respond well to.

Children rarely complain about their sight!

The most important information during the first eye exam of a child is what the parents, grandparents, relatives or the teachers tell the eye care practitioner about their observations of the child at home, at school or at play — because children rarely complain about their sight!

The most prevalent eye disorders amongst children in the developed world include:

Refractive errors (15-30%)

To see clearly, the light entering the eyeball needs to be focused onto the retina — the light sensitive tissue inside the eye. The majority of refractive errors are the result of the failure of the "normal" growth process and are usually easily correctable with prescription spectacles or contact lenses. They fall into three major categories:

Short-sightedness (Myopia): This is the result of the eyeball and its length growing to be too short. Light entering the eyeball is focussed in front of the retina thus resulting in a blurred image perceived by the brain. Short-sighted people can usually see near objects such as books clearly, but find distance objects such as TV and school writing boards unclear.

Long-sightedness (Hypermetropia): This is the result of the eyeball and its length growing to be too long. Light entering the eyeball is focussed behind the retina rather than on it resulting in a blurred image perceived by the brain. Long-sighted people can usually see clearly in the distance but find it hard to see objects at near.

Astigmatism (distorted vision): This is the result of the eyeball and its shape growing to be more like an oval rugby ball rather than a round football. This produces a complex pattern of light on the retina, perceived often as an image more in focus in one direction than another. It often leads to confusion of letters e.g. N and H.

Of course the growth of each eye can be different and can lead to a combination of refractive errors in one or both eyes. Thus it is not unusual for children to be short-sighted and/or long-sighted and astigmatic as well. Similarly one eyeball may have a greater or lesser prescription than the other.
Eye turns (squints 3-4%) and Lazy eyes (amblyopia 2-3%)

A squint means that the eyes are not lined up. In most cases one eye appears to look straight ahead while the other eye turns inwards, outwards, upwards or downwards. Although there are more serious causes for squints, more commonly they are the result of uncorrected refractive errors, often greater in one eye than the other. In the presence of a squinting eye, the brain will receive two images (double vision) - one from each eye. To manage this, in children, the brain suppresses the image from the deviating eye. This then removes the double vision but reduces the ability of the supressed eye to develop properly relative to the other. This can lead to an otherwise normal but deviating eye, becoming "lazy" or amblyopic. Consequently, a child with a suspected squint should be seen by an eye care practitioner as early as possible to identify the most appropriate treatment. This treatment may include one or more of the following:

- Spectacles or contact lenses may be prescribed to help keep the eyes straight and/or to improve the vision of both eyes.
- Surgery may be considered to realign eyes that do not or cannot be realligned properly with spectacles or contact lenses.
- Surgery may also be appropriate to improve the cosmetic appearance of an unsightly squint that cannot be corrected any other way.
- Treatment for a "lazy" eye (amblyopia) may be necessary (best before the age of eight).

This may involve patching the good eye to encourage development of the "lazy" eye and possibly the use of special anti-suppression exercises.

Using both eyes together correctly

In addition to the above, common problems encountered in a clinical setting in developed countries amongst children include:

- An inability to use the two eyes together in the correct way (anomalies of binocular vision).
  - This is the result of a failure of the complex set of muscles to get the two eyes to work in the correct and co-ordinated way.
- An inability to focus clearly and comfortably when reading (accommodation disorders).
  - This is the result of a failure of eyes to see clearly and comfortable both into the distance and at near, by automatically changing the shape of the lens within the eye, with the internal muscles of the eye, to maintain focus as one moves fixation from far to near.
- Binocular vision and/or accommodation anomalies will interfere with performance at school and may cause a number of symptoms, including: eyestrain, intermittent blurring or double vision, loss of place, skipped lines and word movement on the page, a poor attention span when reading and an inability to sustain reading for any length of time.

These anomalies, if present, will become apparent during a detailed eye examination.

Dyslexia

Instability of binocular vision is a known correlate of dyslexia which is a specific learning difficulty that is both difficult to define and to diagnose. It is known that most, but not all dyslexics, tend to reverse letters and some words. For example, mistaking "b" for "d" or "p" and vice versa, and "w" for "s" or "c" for "c". Although most children will make such mistakes to start with, dyslexics continue to do this even after their peers have stopped doing this and have moved on in their development. Further explanations including a video about dyslexia may be found at: http://www.babydyslexia.org.uk. Correcting refractive errors and binocular vision anomalies in dyslexics may help reduce symptoms and improve perception of text in some children. Anything that makes it easier to read for these children can only be positive. But one should not expect for these interventions to correct the reading difficulty or the text reversals. Increasingly eye care practitioners are involved in prescribing precision tinted lenses for some children with difficulty in reading and with symptoms and signs associated with dyslexia. The exact colour of the tint in these filters is established using special equipment (Intuitive Colorimeter) and often issued as an overlay tinted sheet to use over text to begin with, and subsequently prescribed if successful, as a tint in spectacles. Such filters are known to reduce symptoms of eyestrain, headaches, and visual perceptual distortions, which typically occur when reading, and improve reading in some children.

Treatment, depending on the cause, may include:

- Special spectacles with multiple focus lenses, prisms and special exercises.

Colour vision

One in 12 boys and one in 200 girls are colour defective. Although they can see most colours, they may have difficulty with specific colours and may confuse shades of some - reds and greens for example. Although such colour deficiencies are invariably inherited, they can on occasions be the result of disease. Many approaches in education with respect to reading and arithmetic utilise colour. Furthermore, children who are

colour defective will not be aware of their deficiencies and early diagnosis is important, not only for their education but also for career choices. Some vocations and professions do not admit colour defective persons because colour detection is critical for safety reasons. These, in most countries include the armed forces, the merchant navy, public transport services and police and fire services for example. Colour vision tests are somewhat limited for the very young. Although there are some difficulties because the eye has not completely developed yet, given appropriate instructions and test materials, children as young as 3 years old can satisfactorily perform the colour vision tests as part of the eye examination process, and as well as any adult by the age of 8 years. There is no method of correcting colour vision defects; however it is possible by using specialist filters in one eye with a contact lens, to enhance the ability to discriminate certain colours better.

Outdoors in the sunshine

Is "can natural light damage your eyes? Yes it can!" I mentioned that most of the life-long Ultra Violet (UV) light exposure is accumulated in childhood. Excessive exposure to UV can result in damage to the internal lens of the eye and the delicate retinal tissue as well. Therefore protecting children’s eyes against UV radiation is vital when they are outdoors. So it’s essential to help children develop good UV protection habits early in life, such as wearing sunglasses with UV protection. Choose 100% UV blocking sunglasses that fit the child’s face and lifestyle that are large enough to shield the eyes from most angles. Make sure that the sunglasses continue to fit well, are not damaged, and not out of shape and thus ill-fitting with use, and regularly adjusted to fit properly. Ill-fitting sunspecs will not provide proper UV protection. A wide-brimmed hat for them to wear with the sunglasses provided would be a good idea.

What’s really interesting and useful to remember, is that we now know that children who spend more time outdoors are less likely to become short-sighted!

It’s "too late after eight!"

Finally - remember it’s ‘too late after eight’ so get your child’s eyes examined by an eye care professional whilst they are young and before they are 8 years old. This will ensure that your child has the opportunity to achieve their full visual, educational and social potential and avoid the possibility of visual impairment.

References

1. Kreo Magazine, issue 6, July-September 2013, p64-66
2. Kreo Magazine, issue 5, May 2013, p74-76