

CORRECTION OF REFRACTIVE ERRORS OF THE EYE IN ADULTS

PART 1: PERCEPTIONS AND EXPERIENCES – SYNTHESIS





Belgian Health Care Knowledge Centre

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Disclaimer:

The external experts were consulted about a (preliminary) version of the scientific report. Their comments were discussed during meetings. They did not co-author the scientific report and did not necessarily agree with its content.

Subsequently, a (final) version was submitted to the validators. The validation of the report results from a consensus or a voting process between the validators. The validators did not co-author the scientific report and did not necessarily all three agree with its content.

Finally, this report has been approved by common assent by the Executive Board.

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■ FOREWORD

When a health problem affects over one half of the population and becomes nearly generalized by middle age, can we call it a “disease”? In that case, aren't healthy individuals actually abnormal from a statistical standpoint? This is a philosophical question, but one that is not without implications for healthcare insurance. Refractive errors – myopia, hyperopia, presbyopia, astigmatism – are one of these questions. They are situated at the limit between healthcare and simply one of 'life's normal inconveniences'. This also goes true for their solutions (or 'treatments'). For example, people can get reading glasses outside of a medical circuit.

On the other hand, the more severe defects are treated by health professionals. However, the rise of laser techniques and other surgical procedures, used even for mild defects, is in fact the result of the increasing medicalization of the problem. This medicalization largely takes place outside of the regular care circuit, which also means that attempts to take stock of the actual situation are difficult.

The aim of this study, the first of a two-part series, is to map out the problem from a societal point of view. How is the problem perceived among the general population, what are the attitudes and experience with respect to available remedies: glasses, contact lenses and surgical procedures? The study itself probably won't reveal any shocking discoveries, but will provide a good basis to support further reflection on the role of healthcare and healthcare insurance in this problem.

The second study set to be published in the second half of the year will delve deeper into the efficacy, safety and accessibility of laser treatments and other surgical correction methods. The present study will certainly serve as a useful frame of reference for those investigations.

Even though it is not necessarily a serious 'disease', a visual acuity disorder is a problem that affects scores of people and generates considerable discomfort and expense. So, get out your reading glasses and get a sharper view of how our population lives with this condition.

Christian LÉONARD
Deputy general director

Raf MERTENS
General director



■ ABSTRACT

In Belgium, reimbursement of glasses or contact lenses for correction of refractive errors – myopia, astigmatism and hypermetropia, including presbyopia – has traditionally been limited to the most severe cases. Moreover, surgical techniques for correcting refractive errors (i.e. laser surgery and intraocular lenses) fall outside the compulsory health insurance system.

This study has two objectives:

- firstly, to analyse the frequency of refractive errors, as reported by a sample of the population, based on an extensive telephone survey (n=4234);
- and secondly, to identify how these disorders and their correction methods are perceived and experienced by the people involved: for this purpose, individual interviews were conducted face-to-face (n=36) with people who had considered or undergone refractive surgery.

The first finding is that refractive errors are common: 7 out of 10 respondents report at least one refractive error. Myopia is the most frequently cited (38.4%), closely followed by presbyopia (35.7%). Astigmatism (10.8%) and hyperopia (8.9%) are less frequently mentioned. It is interesting to note that respondents often have limited knowledge of the severity of their refractive error, especially regarding the approximate diopter.

Overall, two thirds of respondents use a correction method and the majority of them (95.7%) wear glasses. It should be noted that one respondent in twenty who mentions having a refractive error states that they do not use any correction method. The choice of correction method is influenced by age and gender. Glasses are more frequently chosen by elderly people, while contact lenses are more commonly chosen by young rather than by older people. Women are furthermore more likely than men to opt for contact lenses (16.8% versus 9.7%).

Among those who reported a refractive error, however, 6% have never consulted an ophthalmologist or optician, although two thirds of them wear glasses.



Whatever the correction method, user satisfaction is high: 96.3% for glasses, 93.9% for contact lenses and 85.7% for surgery. Critics frequently expressed are about the cost. One third of respondents (with or without refractive error) declare that they are willing to pay more tax or social security contributions for the reimbursement of correction methods. It is still interesting to note that this percentage is higher for the reimbursement of refractive surgery than for the reimbursement of glasses and contact lenses.



■ SYNTHESIS

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1. BACKGROUND AND SCOPE

The correction of refractive eye disorders – myopia, astigmatism and hypermetropia, including presbyopia – have traditionally been a field at the borderline of health insurance, with reimbursement of glasses or contact lenses being limited to the most severe cases.

Moreover, the surgical techniques for correcting refractive errors (i.e. laser surgery and intraocular lenses) fall completely outside the compulsory health insurance, leaving the field open to the complementary benefits of sickness funds and to private insurers. Given the high frequency of refractive errors, it is not surprising that refractive surgery is a topic of interest to many stakeholders.

This topic was proposed to the KCE by four stakeholders: the Minister of Social Affairs and Public Health, the Federal Public Service (Health, Food Chain Safety and Environment), the National Institute for Health and Disability Insurance (INAMI – RIZIV) and a sickness fund. The questions that were submitted mainly related to the (cost-)effectiveness of refractive surgery, but some also addressed the issue of private clinics offering refractive surgery, more or less outside the regular healthcare system.

Given the diverging nature of the questions, the topic has been split into two distinct study projects:

- The current report describes a wide-scale survey on visual acuity disorders (including refractive errors) reported by the population and the perception of refractive error by these patients.
- A second report will provide a health technology assessment of refractive eye surgery techniques.

This report is based on two modes of data collection:

- A **telephone survey** on reported refractive error among adults in Belgium. Using a quota sampling technique, a call centre contacted a total of 16 302 persons, resulting in 4 234 completed interviews. Due attention was paid to include mobiles as well as fixed telephone numbers. The sample characteristics are comparable to the characteristics of Belgian population, as shown in the scientific report (section 3.1). However this similarity does not imply a strict representativity.

- A **qualitative study** on the perception of refractive errors among a sample of adults who were considering, were planning or who underwent refractive surgery for myopia or hyperopia. The researchers conducted face-to-face interviews with 36 respondents. The criteria used to build a balanced purposive sample included age, language, social class, severity of refractive error and whether the respondent only considered or planned versus already underwent the procedure.



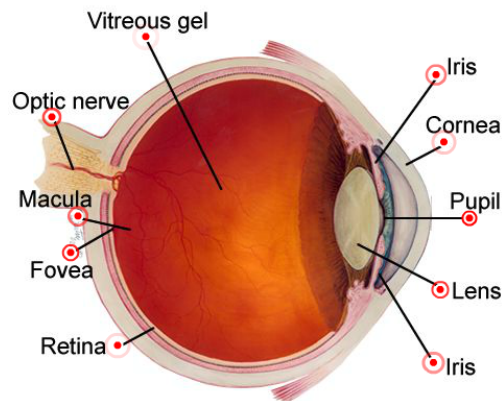
2. REFRACTIVE ERROR: A COMMON DISORDER WITH IMPACT ON THE PATIENT

2.1. What is a refractive error?

The eye is a complex sensory organ, to a certain extent functioning like a camera.

- The transparent cornea captures the external light;
- The light passes through the pupil and the eye's adaptive crystalline lens located behind the pupil further focuses the light. This lens, by changing shape, changes the focal distance of the eye so that it can accommodate to objects at various distances;
- Finally, the light is focused on the retina, a sensitive tissue lining the inner surface of the eye: the retina transforms optical images into electrochemical signals that are transmitted to the central nervous system through the optic nerve.

Figure 1 – Anatomy of the eye (source: National Eye Institute)



Refractive errors occur when the shape of the eye prevents light from focusing directly on the retina. The eyeball can be too long or too short but also changes in the shape of the cornea or aging of the lens can cause refractive errors. The most common symptoms are reduced visual acuity, blurred vision, eyestrain and headaches.

There are four types of refractive error:

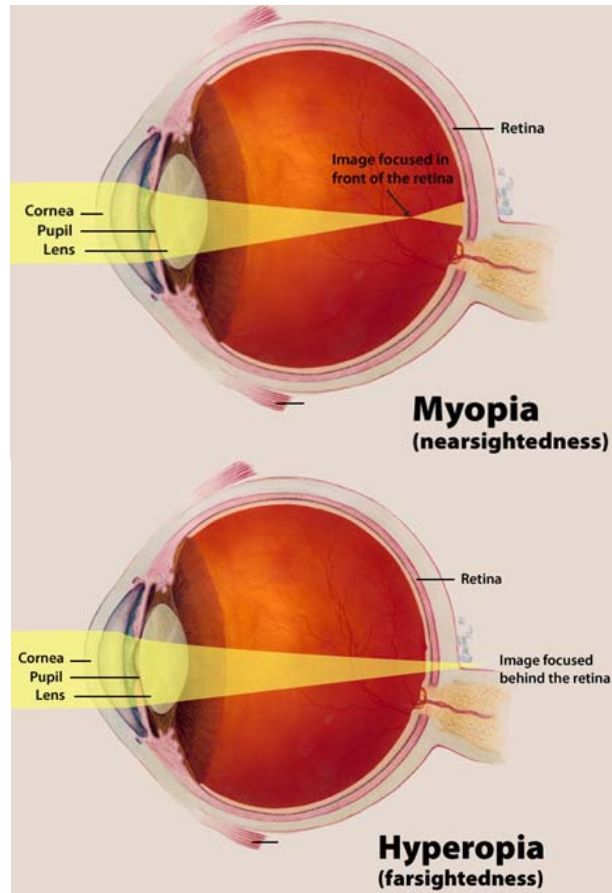
- **Myopia** (nearsightedness or shortsightedness) is a condition where the light that comes in does not directly focus on the retina but in front of it. As a result objects close-by appear clearly, while objects far away appear out of focus (see Figure 2).
- **Hyperopia** (farsightedness, hypermetropia or hypermetropia) is a condition where the eyes focus images behind the retina instead of on the retina (see Figure 2). As a result objects close-by appear out of focus.
- **Presbyopia** is a specific, age-related type of farsightedness, due to the hardening of the eye lens, impairing accommodation to close objects.
- **Astigmatism** is an abnormal curvature of the cornea, where the eye does not focus light evenly onto the retina.

Anisometropia occurs when each eye presents a different refractive error. Both eyes may present the same type of refractive error with large differences in visual acuity or each eye may present a different error, for example hyperopia and myopia respectively.

It should be noted that **cataract** is not a refractive error: its cause is a clouding of the lens, frequently related to aging. Still the replacement of the intraocular lens in cataract surgery is a technique that has similarities with one technique used for correcting refractive errors (see 3.3, insertion of intraocular lenses).



Figure 2 – Refractive error in myopia and hyperopia (source: National Eye Institute)



2.2. Refractive error is a frequent problem in Belgium and abroad

In the telephone survey almost 90% of the respondents reported good, very good or perfect visual acuity, with or without the use of a correction method. Nevertheless, about 7 out of 10 respondents mentioned at least one type of refractive error: myopia is the most frequent one (38.4%), closely followed by presbyopia (35.8%). Astigmatism (10.9%) and hyperopia (9.0%) are less often mentioned. Almost half of the respondents have no idea about the severity of their refractive error (i.e. approximate diopter).

Age, gender and social class influence the answers:

- about half of respondents younger than 45 years report a refractive error but this percentage raises to 95.3% in the group older than 65 years;
- women report more often myopia (43.6%) than men (33.1%);
- people with a higher socio-economic status (SES) report more often a refractive error, in particular myopia (43.2% versus 33.0% in the lowest SES group).

A major limitation of these figures is their self-reported nature. The comparison with other studies based on objective measurements is therefore a delicate issue. Still, data from the international literature give an idea of the frequency of the problem in other Western countries. A Dutch study in hospital employees found 29.7% myopic eyes and 9.9% hyperopic eyes. These proportions are similar to the ones published about 6 Western populations (n=29 281) where approximately one third of the persons aged 40 years or more had a refractive error. The prevalence increases with age as shown by a national US study: respectively 46.3%, 50.6% and 62.7% in the age groups of 20-39 years, 40-59 years and older than 60 years.



2.3. Refractive error: concrete impact for the patient

The impact of the refractive error on daily life was considered quite significant by the participants in the face-to-face interviews, particularly by respondents with myopia. Having a refractive error is reported to have an impact on self-worth (e.g. feeling incompetent and handicapped) and to cause embarrassment (not able to recognize people, danger). These feelings depend on the severity of the refractive error. In addition, the glasses or lenses needed to correct the refractive error(s) limit freedom and may affect daily life, as explained in sections 3.1 and 3.2 below.

2.4. Consulting for eyesight problems is not evident for all

Seven out of ten respondents in the total sample stated that they ever consulted an ophthalmologist (75.2% of the women, 65.0% of the men). This percentage was 43.1% for the consultation with an optician.

One out of twenty respondents who reported a refractive error stated that they consulted neither an ophthalmologist, nor an optician. Still two thirds of the persons within this group (mainly older respondents) wear glasses. The reason most often cited for not consulting is “no need for it”.

3. CORRECTION OF REFRACTIVE ERRORS

Two thirds (65.6%) of the population interviewed report the use of a correction method: glasses, contact lenses (soft or rigid) and/or surgery. One out of twenty respondents declares that they suffer from refractive error but do not report the use of any correction method.

3.1. Glasses get the preference but they are not the optimal solution for everybody

The most common correction method are glasses i.e. 95.7% of all respondents using a correction method in this study. Almost all respondents wearing glasses (96.3%) express their satisfaction, in particular younger respondents.

A quarter of the people who wear glasses mention the comfort of this correction method (25.8%). Glasses are also practical for people who need a correction method for specific activities only (17.9%) (e.g. to read small characters or to watch television). Opting for glasses is rather a habit than a conscious choice for some people (8.8%), especially older respondents. One out of six respondents who wear glasses said that they had no choice because they suffered from side effects of contact lenses. Other ones (9.8%) also mentioned that glasses were the only option because their disorder does not allow to wear contact lenses.

The participants in both the telephone survey and the individual in-depth interviews mentioned drawbacks of glasses such as:

- the price: a quarter of the respondents who wear glasses (24.5%) report dissatisfaction about the price. Some interviewees who considered or underwent eye surgery hoped to make savings at the long term because they would not need glasses anymore;
- inconvenience and discomfort: one out of 10 respondents who wear glasses is dissatisfied about the ease of use. Interviewees say that glasses are not easy to wear during sport sessions or for specific jobs. Moreover, glasses get dirty and weigh on the nose;



- aesthetic issues: were mentioned by many interviewees (with resulting negative feelings) and by 8% of respondents in the survey;
- perception by the others: interviewees said that glasses can affect the reaction of others, resulting in feeling different, handicapped.

3.2. Contact lenses are appreciated but present side effects

Only 13.6% (n=377) of the population under study wear contact lenses and 3 out of 4 users combine them with glasses. The most popular lenses are soft monthly disposable lenses (64.5%), followed by soft daily disposable lenses (17.2%). Younger age groups are more likely to opt for lenses (71.8% of the users are younger than 45 years). Women are also more likely to wear lenses (16.8%) than men (9.7%).

About half of the contact lenses users (54.6%) reported to wear them all the time. Other respondents wear them for specific activities, in particular to exercise (66.1%), to go out (55.0%) and to work (31.6%). When contact lenses are used in combination with glasses, they are more likely used during the day or at specific moments (e.g. at work, when performing physical activities, when going out), while people wear their glasses when coming home.

More advantages were mentioned for contact lenses than for glasses:

- comfort (reported by half of the survey respondents who use lenses): the interviewees stated that the vision with contact lenses is close to perfection, with a feeling of freedom;
- convenience for specific activities, sports in particular (reported by one third of the survey respondents who use them);
- aesthetic issues (important for a quarter of the users in the survey): some interviewees also mention that they feel better about their look without glasses;
- interviewees added that wearing contact lenses may lead to easier relations/interaction with others, whilst feeling more confident.

However contact lenses are not the best option for everybody. The respondents of the survey who stopped wearing lenses mentioned side effects (63%), difficulty of use (29.6%) and the unavailability of an appropriate lens for their refractive error (7.1%). The interviewees mentioned eye fatigue, dry/watery eyes and infection as side effects. Some

had a feeling of insecurity linked to the presence of a foreign object in the eye. Moreover a combination with glasses means an additional burden. Finally, lenses and products are reported to be expensive (see also section 4).

3.3. Refractive eye surgery: the last but not the least option

There are today two main groups of surgical techniques that aim to correct refractive errors:

- laser surgery: the most commonly used technique today is LASIK, a term standing for LAser in SItu Keratomileusis. A laser reshapes the cornea in order to modify its refractive properties and thereby corrects myopia or hyperopia (with/without astigmatism). "In situ" refers to the fact that the procedure is performed at the site where the problem occurs. "Keratomileusis" refers to the reshaping of the cornea. Laser procedures are performed under local anaesthesia using anaesthetic drops.
- insertion of an intraocular lens of appropriate power (phakic intraocular lens) in front of the original lens, leaving this original lens in place and keeping the mechanism of accommodation. Another method of intraocular refractive surgery consists of the removal of the original lens, as done for the treatment of cataract, and its replacement by an artificial lens.

No more than 2.6% (n=71) of the survey respondents declared that they had had a refractive eye surgery, usually a long time ago (as far back as 10 years ago). Their experience was not eligible for further analysis as there were serious doubts about the validity of their answers (e.g. if they spoke about refractive surgery). The sections below describe the perceptions of only the interviewees who considered, planned or underwent the intervention (maximum 4 years ago).



3.3.1. *Refractive surgery: a luxury surgery with appreciable outcomes*

Refractive eye surgery is costly and not reimbursed (see 4.1). Therefore it is considered as a luxury surgery for wealthy people who highly value aesthetics since other correction methods are available. However, the patients who have undergone surgery as a 'last resort' (e.g. because they had a high diopter) did not agree with this opinion.

Even so, the interviewees wondered whether it is worthwhile to pay and to take risks for a non life-threatening condition, in particular because the techniques currently used are quite recent: therefore the interviewees stated that there is a need for reassurance on safety and performance of the technology.

Opting for refractive surgery is driven by different motives:

- comfort and aesthetic issues: the hope of interviewees was to get rid of glasses or contact lenses, with as a result a better look and new opportunities (e.g. sports, access to some professions);
- health: surgery improves the visual acuity;
- well-being: the patients rediscover their own identity and freedom;
- budget: the intervention is sometimes perceived as a long-term investment, allowing saving money in the long run.

3.3.2. *Yet an intervention resulting from a long decision-making process*

The decision process to undergo refractive eye surgery takes from a few months to several years. Patients need time to feel comfortable with the idea of surgery and the risks involved. Some patients also take some time for putting money aside for the surgery, especially when their decision is more aesthetical or convenience driven. All gather information to weigh up the pros and cons and they consult various parties:

- 'experts by experience' are considered as the most important source of information on the operation;
- the internet is consulted to get information on the techniques and the risks;
- only in a third step the ophthalmologist is consulted to access specialist knowledge.

The decision whether or not to undergo surgery will ultimately depend upon:

- the perceived necessity: a given 'tipping point' needs to be reached before deciding upon refractive eye surgery;
- the costs: weighed off against a lifelong expenditure on glasses (or lenses and lens care products): surgery would be paid back after 4 to 6 years. One third of the patients who considered eye surgery but did not take the final step towards operation mentioned the costs as the primary reason.
- concurrent expenses (e.g. for home renovation): other family expenses can delay the operation, but are not necessarily a reason to give up surgery.

The experience of the patients who opted for surgery will be described in the subsequent health technology assessment report.



4. PATIENT EXPENSES

4.1. Reimbursement of eye correction methods in Belgium

4.1.1. *Reimbursement by the compulsory health insurance for specific conditions*

Glasses for adults are not reimbursed by the compulsory health insurance except for patients who need eye correction greater than $- 8.25$ or $+ 8.25$ diopters (reimbursement between €78 and €362). They are entitled to reimbursement of renewal of glasses either every five years or when the optical power has changed by at least 0.5 diopter. For people older than 65 years, the diopter threshold for bifocal and multifocal glasses is lowered to $+ or - 4.25$ diopters (instead of $+ or 8.25$).

Contact lenses are also only reimbursed in case of large corrections ($+ or - 8.25$ diopters) or specific conditions (e.g. anisometropia of 3 diopters or more).. The reimbursement varies from €70 to €210, according to lens types (hard/soft/optical scleral, spherical/toric). There is also a lump sum reimbursement for the renewal and fitting of lenses (€40). A renewal is allowed after one (soft lenses) to 3 years (hard lenses) or when there is an increase of at least one diopter.

Surgery to correct refractive errors is not reimbursed by the compulsory health insurance. On the other hand it reimburses interventions for cataract but the indications for which this specific nomenclature code can be used are not specific for this disorder (i.e. possible use for the correction of presbyopia).

4.1.2. *Fixed amounts from complementary insurance*

Nearly all complementary insurance schemes of the sickness funds offer reimbursements for corrective eyewear but the amounts and allowed renewal frequencies differ. Some complementary insurance policies also provide a fixed amount for the reimbursement of refractive surgery (from €150 to €400 for both eyes).

4.2. Eyesight correction: often a considerable cost

- Glasses: patient costs go up with age

Whereas the expenditure on the frame is a matter of personal choice, the expenditure on glasses depends on the severity and type of refractive error (e.g. mono versus multifocal) and on the characteristics of the glasses (e.g. thickness). One quarter of the total sample declared to spend more than €500 on a pair of glasses including frame, another fifth spent between €300 and €500. In particular older respondents tend to spend more: 44% in the age category 65+ spend more than €500.

More than half of the respondents (54.6%) indicated that they bought new glasses because their visual acuity changed and 28.4% because the glasses were damaged. Only a minority (16.3%) mentioned fashion as a reason for change.

- Contact lenses: expenditures depend on lens type

The yearly cost of lenses depends to a large extent on the type of lenses. Daily lenses are the most expensive ones. The yearly cost estimate based on the survey (up to €950) is much higher than the estimates of the opticians' association (€440). Yet most users wear monthly contact lenses: the yearly cost is estimated around €120 according to the survey and €220 according to the opticians' association.

- Surgery: a range of estimates

The interviewees gave an estimate between €2000 and €3000 for both eyes (with a maximum of €6000). As mentioned above, the validity of these figures is questionable.



5. CONCLUSIONS

New insight into frequent eye disorders

This study shows that refractive error is a frequent disorder that would affect up to two thirds of the adults in Belgium: these disorders and the related correction methods may have an emotional impact and an influence on the social life.

In real life eyesight problems are not always medicalised: within the group of patients who report a refractive error, 6% never consulted neither an ophthalmologist, nor an optician: still, two thirds of them wear glasses.

Sketchy patients' knowledge

Of course the interpretation of medical data reported by the respondents should be interpreted with caution as the knowledge of their refractive disorder (and its severity) is doubtful. This study shows that the respondents have a vague knowledge about their eyesight problems. The question is to know if they received the information in a tailored way and/or if they understood it. In the same way the answers that related to surgery could not be included in the analysis of the telephone survey given the inconsistencies between the answers formulated to different questions.

Correction methods: satisfied users

One noticeable finding is that almost all respondents are satisfied with their correction method, with comfort being the main perceived advantage. Yet the use of lenses is not that common in Belgium: a little more than one out of ten persons with a refractive error use them. Still, in combination with glasses this accounts for three quarters of the users. Surgery is even less popular: researchers experienced serious difficulties to identify possible candidates for interviews about refractive surgery and only 2.5% of the respondents in the survey stated they underwent it.

...But an expense for the patient

Nearly half of the sample spent more than €300 to buy their last pair of glasses. The budget mentioned for a type of contact lenses was even higher. Many interviewees who considered or underwent surgery furthermore acknowledged that this surgery is a luxury: still, a few people hoped to make savings in the long run.

Consensus for reimbursement based on medical needs

Most interviewees stated that eye glasses and contact lenses should be accessible to all and therefore benefit from some kind of reimbursement, based on the severity of the refractive error. However it is strange to see the position of the telephone respondents: they would be more willing to pay taxes or social security contribution for reimbursement of refractive surgery than for reimbursement of glasses or contact lenses. Perhaps the notion of "surgery" more specifically relates to an idea of high costs and thereby necessary intervention of the health care insurance.

The general position of interviewees regarding refractive surgery follows the general idea that luxury surgery should not be fully reimbursed by the health insurance because it would be too heavy for the tax payer, the disorder is not a life threatening condition and other solutions exist.



■ RECOMMENDATIONS^a

To the clinicians and sickness funds:

- The patients with refractive error need clear information on the different correction methods and their reimbursement;
- The patients who consider refractive surgery need to receive tailored information on the appropriate techniques, in particular the expected outcomes (e.g. the possibility to wear glasses after the intervention), safety aspects and the cost.

To the National Institute for Health and Disability Insurance:

- Before considering a possible change of the reimbursement criteria for the correction methods, one should further explore the societal base in relation to the level of severity to be considered, to the amount and to the frequency of reimbursement. This question could be the topic of an approach to poll the societal values, as envisaged within the project 'Citizens and patients participation'. This ongoing KCE project benefits from the collaboration of the Foundation King Baudouin and of the Institute for Health and Disability Insurance.

^a The KCE has sole responsibility for the recommendations.

