

## Case studies of children with cochlear implant rehabilitation therapy, in Belgium



**Title of the case study: Frederica, age 14**

### 1. General data on the case:

- **Biographical and case identification data – personal data, address, important events in the biography of subject, significant data on the composition of the family, hearing status parents, etc**

Frederica is the second daughter of a hearing family. Both parents and her older sister are hearing.

- **Case history (Anamnesis):**

- **Significant medical data** – By the universal neonatal hearing screening, a unilateral hearing loss was detected at birth. Further objective measurements (BERA) showed a unilateral hearing loss of 60 dB on her right ear. Further genetic counselling showed that the mother had a congenital cytomegalovirus (cCMV)-infection during pregnancy. Already at the age of 6 months, her mother detected that Frederica was not reacting anymore to speech sounds and further objective measurements showed a bilateral severe hearing loss above 90 dB.

At the age of 10 months she received a cochlear implant at her right ear. Because at that time (2006) there was no reimbursement for bilateral implants in children she was still wearing her hearing aid (HA) on the left side, although she was only picking up low frequencies.

But in 2008, a big research study took place in Belgium in which 42 children received a second CI. Frederica was part of this study and received her second CI at age 2 (February 2008).

- **Significant psychological data** – Although the cause of the deafness was CMV, Frederica has no additional needs. She developed good speech and spoken language, but was not developing spontaneously. She was also a very silent and shy toddler and it was difficult to have an idea of her possibilities. She really needed good support and intensive rehabilitation, focussing on audition and spoken language development. Signs were used to support spoken language during the early years and to increase the comprehension of spoken language. As soon as she developed spoken language, she and also the parents stopped using supported signs.

On the intelligence scale WPPSI-Revised (at age 5;6 y) Frederica scored a non-verbal IQ of 110 and a Verbal IQ of 92, which means she has above average non-verbal skills and already low average verbal skills.

Once she could communicate using spoken language, she became a silent, but very social child, with a lot of friends at school and at home.



- **Educational setting:** At age 13 months, after receiving her first CI, Frederica started in a multidisciplinary day care centre for babies and toddlers with a hearing loss, where she had daily speech and language therapy. At age 3 she started in an oral special school for the deaf, where she stayed till age 5;6 y, when she moved to a regular school with her hearing age mates. Primary school went well, without any big problems. Now at age 14, she is in the second year of secondary school, following general secondary education. She already knows she wants to study at University some social profession (social worker, psychology, education, ...).

**Significant social data :** Both parents have a university degree: mother at bachelor level and father at master level.

- **Age of fitting the first hearing aids and cochlear implants:** At age 10 months Frederica received her first CI (right side) which was fitted at age 11 months. She started wearing a hearing aid at the opposite ear, but received sequentially at age of 2 years her second cochlear implant as part of a bilateral research study. Both fittings went smoothly without any big problems.
- **How often and what kind of support/rehabilitation does the child/family receive?**  
After the referral at the Neonatal Hearing Screening, the parents received support from an early intervention team at home, especially focussing on answering all the questions these parents had especially the sudden onset of deafness at age 6 months.  
Also the fact that the cause of the deafness was a CMV infection during pregnancy, was a big chock for Frederica's mother, who felt guilty. Immediately after receiving her cochlear implant (age 11 months), Frederica started in a multidisciplinary day-care centre for babies and toddlers with a hearing loss, where she received 3x/week individual speech and language therapy. The parents received (in a group of parents) more information on how to nurture and educate deaf children and on how to communicate and to stimulate spoken language.

### 3. The implantation

- **age of undergoing first cochlear implantation :** 10 months right side,
- **type of implant:** Cochlear Nucleus 24 contour electrode + Freedom body worn processor
- **number of implants (CI and hearing aids):** CI1 at 10 months; CI2 at 24 months
- **current average duration of the CI use** (information from the audiologists): 14 hours/day
- **other relevant information: difficult periods during early stage development. If yes, why?**  
No real difficult periods in using devices. Parents only remembers a lot of coil problems with the first sound processor (Sprint).

### 4. What is the procedure to start the speech therapy after CI? (actors involved, what is needed)

Already before cochlear implantation, the CI-team discusses with the parents the rehabilitation after implantation. They suggested a multidisciplinary day-care centre at 20 km distance from the family, which they also decided to do.



Children can only go to this kind of day-care centre after receiving a certification from the government of health care, based on the audiogram and a short report signed by an ENT-doctor.

## 5. The Speech Therapy used in the rehabilitation

- The speech therapy was integrated in the work of the multidisciplinary day care centre. Children can receive daily therapy : speech therapy + also physical therapy if needed + audiological support
- **Frederica came 3 days/week to this multidisciplinary day-care centre** and every day she received individual speech therapy. Also an audiologist is working in the day-care centre and works close together with the audiologist of the fitting team.
- **listening development** : already a few weeks after her first fitting, it was clear that Frederica started reacting to speech sounds (monitored by using the Ling sounds)
- **speech production development**: Frederica was a slow starter. She was a very quiet and shy baby who gave the impression that speech and spoken language was very difficult for her. But it was clear she was able to understand a lot, although her speech production was very poor. Between age 2.6 and 3.6 y she started talking and her speech production increase quickly. She has also a very nice natural voice.
- **spoken language development**: in early communication, parents and therapists decided to use some signs to support the spoken language, because it was not clear yet if she was able to discriminate all speech sounds or not. The signs were also supporting her comprehension of spoken language. The early spoken language development took some time and Febe needed some extra support (by the speech and language therapist) to come to spoken language. Also the parents were coached on how to support the child's spoken language development at home.
- **monitoring of the progress in auditory, speech and spoken language development. How?** In the day-care centre audition, speech, spoken language development, cognitive development and social emotional development is monitored very well. Every 6 months there is a multidisciplinary meeting with the parents on the development of their child.
- **Audition** is monitored by: tonal audiogram, Ling sounds, Auditory Speech Sound Evaluation (ASSE)-test, Littleears parent questionnaire. Also the NAMES (Nottingham, Auditory Milestones) is used to monitor the early auditory development.
- **Speech** is monitored by a Dutch Speech test
- **Spoken language** (expressive and receptive) is monitored by the Bayley Scale and later by the CELF-test.

The NEAP (Nottingham Early Assessment Package) is also a very interesting monitor to be used the first 3 years after implantation. This assessment package is also available in the Dutch language.



## 6. Results



### SWOT analysis by Frederica

**Strengths:** Frederica has little or no memories from the content of the rehab she received as a young child. She liked the idea to be educated with deaf peers as a toddler. Although she moved to the regular school at age 5, she still has regular **contact (using social media) with her deaf and hard of hearing friends.** Ones in regular school, I received extra support from a speech and language therapist (SLT) from the mainstream support service. This was very useful for me but also for my teachers.

**Weaknesses:** She did not **like to be taken out of the classroom for therapy or support.** She wants to be treated as much as possible as her hearing classmates.

**Transition stages** (moving from special to regular school or from primary to secondary school) are very difficult stages in which I really needed some extra support (which I was missing). The start in a new school is so important, and created a lot of stress, because **I missed a lot of information.** Some extra support during these stages is really welcome.

**Opportunities:** I was really happy that **my parents** supported me very well during some difficult moments (they have taken contact with my teachers a couple of time). As a young child I was very quiet and passive in the classroom. I did not like to speak in public in the classroom, because I know it was not on the same level as my classmates. So I think it is really important that **parents also stimulate their child to become more active in communication** with their environment. They have to stimulate their child **to take initiative.**

**Threats:** I was lucky I always received **good support.** First **intensive training in speech and spoken language** and ones integrated in a regular school, every 2 weeks, one hour of **support from a SLT who visits me in the regular school.**

I do not like to go to the CI-team **for fitting.** This is always a stressful situation and the audiologist often wants to change something in the settings of the CI. I don't like these adaptations in the programming ones I am satisfied with my speech perception. Also upgrades needs special attention. They should take place at a good moment (not during exams).



I never had big problems to understand the teacher in the classroom. I also use a distance microphone most of the time. But now with **Covid and with teachers wearing masks and with distance (online) learning**, I often cannot understand the teachers.

### **SWOT analysis by Frederica's parents**

**Strengths:** Although the detection of a (progressive) hearing loss caused by a CMV infection was a **big chock for both of us**, we were very happy we received excellent support and information from : **the ENT-doctor and the early intervention team**. After Frederica received her first CI, she started in a **multidisciplinary crèche for children with a hearing loss, called 'KIDSJE'**. This was really the best place to be. The multidisciplinary team of the crèche consists of: a speech and language therapist, teacher of the deaf, audiologist, physiotherapist, psychologist and social worker and they work in close cooperation with the CI-team. In group as well as individually the children receive intensive stimulation of their listening and spoken language.

Also the **parents receive (in group) information** on how to nurture a child with a hearing loss and on how to communicate with your child who has a hearing loss. We loved the content of this course, but also the contact with other parents. Now, 14 years later, we still have contact with other parents of deaf children, who we met during these parent sessions. The success to day is the result of the excellent work during the early years.

**Weaknesses:** We received excellent support **with little or no weaknesses**. For us, it was **hard to find the right moment to make the step from a special preschool for the deaf** (of which we were very satisfied) to a regular school. Transition periods like these (but also moving from primary school to secondary school) are still difficult periods, during which we miss some extra support. Every transition phase is always a big challenge for us as parents and for Frederica.

**Opportunities:** The support we and our child received from **the multidisciplinary team in KIDSJE was excellent** and it is hard to improve it. The only thing we can suggest is to **involve the parents even more in therapy**.

**Threats:** we **had little or no negative experiences** on the support we and our child received. We were supported by excellent professionals with a lot of experience and knowledge in educating deaf children and in stimulating listening and spoken language in children with a hearing loss.

