The Royal Institute for Deaf and Blind Children (RIDBC) provides specialist support to children with a sensory disability, e.g., a vision or hearing impairment. Recent developments in telecommunications technologies have enabled RIDBC to expand their services to better support families and children living in regional and remote areas of Australia. This paper outlines the challenges of accessing support in regional and remote areas, the innovative uses of telecommunications technologies, the specific technologies that have been trialled, the model of service delivery and the technologies currently in use.

INTRODUCTION

The Royal Institute for Deaf and Blind Children (RIDBC) has been assisting children with a sensory disability, e.g., a hearing or vision impairment, for over 150 years. Since it was founded in 1861, RIDBC has been at the forefront of sensory disability, constantly striving to find new and innovative ways of supporting children and their families. Hearing loss and vision loss are both considered to be ‘low-incidence’ disabilities, however, these disabilities are not restricted to densely populated areas. Hearing and vision loss affect the Australian population indiscriminately, regardless of location. However, additional social and environmental factors can lead some regional and remote areas such as indigenous communities to be even more frequently affected by sensory disability (Senate Community Affairs References Committee 2010).

Prior to the development of modern telecommunication technologies, families in rural and remote areas of Australia had limited or no access to specialist support for their children with a sensory disability. Families were often obliged to make long journeys to major metropolitan centres to attend appointments with their children. The introduction of high speed broadband and cellular networks has brought the city to the bush. Modern telecommunication technologies have removed the burden of long journeys and provided families with greater access to regular, intensive support with experts in the field of sensory disability. Not only have new technologies provided access to these services locally, but many families now utilise videoconferencing technology in their homes and access specialist support without having to leave their lounge rooms.

RATIONALE FOR RIDBC TELESCHOOL

Three major factors prompted the development of the RIDBC Teleschool program: the importance of early intervention, the lack of expertise in regional and remote areas and the vastness of Australia. It has been well documented that children with a sensory disability require specialised early intervention support (Sass-Lehrer 2002). Research has also shown that early diagnosis and intervention in children with hearing loss leads to more natural language development (Yoshinaga-Itano et al 1998). For children with vision impairment or
blindness, early specialised intervention is needed in all areas of development and must offer the child experiences and opportunities for independent and active learning (White and Telec 1998). Given the importance of early intervention for children with a sensory disability, there is an urgent need for families to have access to early and intensive support. Due to the low incidence of sensory disability, however, many families in regional and remote areas of Australia do not have access to this kind of specialised support.

Recruitment, retention and ongoing professional development are additional issues that raise significant challenges in regional and remote areas. These challenges exist across most sectors; however, the impact is felt even more greatly in the area of sensory disability. Given the highly specialised nature of sensory impairment, professionals require a specific and unique skill set for supporting children with a sensory impairment. There are a limited number of programs aimed at training professionals in the area of sensory impairment, and consequently the number of professionals who are specifically trained to work in the field is low. This limited supply of qualified professionals cannot meet the demand, which results in many positions remaining vacant. Retention is also a challenge as professionals in regional and remote areas are often expected to cover vast geographical distances and support caseloads that are broad-ranging and encompass wide age ranges and varying levels of complexity. In addition, specialists have difficulty accessing opportunities for professional development, material and technical resources, and informational resources on recommended or proven practices (Rude et al 2005). Professionals in these positions are often the only professional in the area, and frequently experience a greater sense of isolation and lack of support. The combination of these factors results in higher staff turnover in regional and remote areas (Ludlow 2005).

The third key factor in the decision to create RIDBC Teleschool is related to distance. The ‘tyranny of distance’ is a well-known phenomenon in the Australian context. In area, Australia is the world’s sixth largest nation but in population, Australia is home to just 21 million people (Department of Foreign Affairs and Trade 2008). Two-thirds of the population live in major cities as defined by the Australian Bureau of Statistics, while the remaining one-third of the population live in regional and remote areas. For this segment of the population, access to specialist services is severely limited. A Parliamentary Report released by the Federal Government in 2002 highlighted the limited expertise available in regional and remote areas of Australia, particularly in the area of sensory disability (Employment, Workplace Relations and Education Committee 2002). In order to access professionals in the area of sensory impairment, families have generally been obliged to travel great distances to attend appointments at specialist centres in the nearest major city. In some cases, families have even relocated to major cities to avoid the costs and time involved in such frequent travel.

These three factors – importance of early intervention, lack of expertise and distance – combined to highlight a significant gap in services for regionally and remotely located families whose children were diagnosed with a sensory impairment.

ORIGINS OF RIDBC TELESCHOOL

Historically, families living in regional and remote areas of Australia received limited, if any, support for their child’s sensory disability. Support was generally provided through correspondence courses, infrequent outreach visits by specialists or by undertaking long journeys to major cities. RIDBC sought to improve the equity of access to disability services through the use of emerging telecommunications technologies. By the late 1990’s, advances in mainstream telecommunications technologies provided the means to connect families with professionals using real-time two-way audio and video transmission. RIDBC initially developed a program which relied on existing Integrated Services Digital Network (ISDN) connections to link families in the country with professionals in the city. These ISDN connections were often found in hospitals and community health centres. Families reported satisfaction with the support they received via videoconference but reported challenges with
the locations and scheduling. Consequently, RIDBC sought alternatives to the ISDN lines and explored the use of broadband to provide videoconferencing directly into family homes.

Technologically speaking, videoconferencing is a very demanding task and requires fast upload and download speeds at both the sending and receiving ends of the connection. For best results, videoconferencing also requires the upload and download speeds to be equal to each other. In 2004, Symmetric Digital Subscriber Lines (SDSL) met these requirements and RIDBC began trialling the use of SDSL in family homes. The SDSL connection was coupled with dedicated videoconferencing equipment which included a camera, a codec and a microphone. This equipment was then connected to the family television. The use of SDSL was successful in terms of speed and quality, but the technology also raised new challenges. In most cases, it was necessary to install an additional phone line that could be dedicated to videoconferencing. Installation in rural and remote areas often took three to six months with a further one to three month waiting period for an Internet service to be assigned to this dedicated phone line. Once the telecommunications technology was in place, a staff member from RIDBC would travel to the family home and install the dedicated videoconferencing equipment. This process was time consuming and costly and meant that families were not getting immediate access to the support they needed. After trialling this approach with ten families, RIDBC decided to investigate other options.

In 2007, RIDBC began evaluating the possible use of the Telstra 3G network to transmit videoconferencing sessions. The introduction of the 3G network in regional and remote areas offered new potential for RIDBC to connect to families and a small pilot project with three families was undertaken. Installation times were dramatically decreased as families did not need to wait for a second phone line to be installed nor did they need to wait for the subsequent installation of an Internet connection. Instead, a specially-designed modem/router and a Telstra SIM card were connected directly to the videoconferencing equipment and an aerial was used to boost the signal. Again, the videoconferencing equipment was connected to the family television. The availability of 3G connectivity in most regional and remote locations eliminated the need for an additional phone line, which had been the major barrier to the immediate installation of in-home videoconferencing equipment. The biggest limitation of the 3G solution became the availability of equipment and the associated delivery times. However, even taking this into account, families could now be connected to a specialist in sensory disability in a matter of weeks instead of months. From the success of this project, the new RIDBC Teleschool was born and the number of families using in-home videoconferencing grew exponentially.

<table>
<thead>
<tr>
<th>Year</th>
<th>Connection type</th>
<th>Location</th>
<th>Equipment</th>
<th>Installation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>ISDN</td>
<td>studios at hospitals or community health centres</td>
<td>Dedicated videoconference equipment</td>
<td>N/A (sites already established)</td>
</tr>
<tr>
<td>2004</td>
<td>SDSL</td>
<td>in the family home</td>
<td>Second phone line, Internet connection, dedicated videoconference equipment</td>
<td>four to nine months</td>
</tr>
<tr>
<td>2007</td>
<td>3G</td>
<td>in the family home</td>
<td>Router/modem, 3G SIM card, aerial, dedicated videoconference equipment</td>
<td>four to nine weeks</td>
</tr>
</tbody>
</table>

Table 1 - Telecommunications technologies trialled by RIDBC Teleschool between 2002 - 2007
CURRENT MODEL OF SERVICE DELIVERY

The staff at RIDBC Teleschool is composed of highly qualified and experienced professionals. They encompass a wide range of expertise, including numerous subspecialty areas related to sensory disability. These professionals are based in Sydney and connect with each family via videoconference on a weekly basis to provide one hour of regular, intensive, specialist support. Families are provided with lesson plans and materials via the post or email depending on the needs of the child. Weekly videoconferencing sessions are supplemented with phone and email contact. Local professionals are often involved in weekly sessions. Benefits for local professionals include an increase in their understanding of sensory disability, access to professional development, information about recommended practice in sensory disability and a decreased sense of isolation. Families also benefit from the participation of local professionals, as this provides a more cohesive and coordinated approach to supporting the child and family. RIDBC Teleschool is currently supporting 165 families in all states and territories of Australia and videoconferences are now delivered through three distinct transmission methods: ISDN, 3G/NextG and broadband.

Our early trials with videoconferencing demonstrated that ISDN videoconferencing provides a reliable connection. ISDN lines are generally located in an existing studio, which means that families can begin accessing services almost immediately. Additionally, existing sites typically employ a technical support person who can assist the family and alleviate any concerns about operating the technology. ISDN is currently the preferred transmission method for newly enrolled families at RIDBC Teleschool as it is reliable, accessible and supported by local technical staff. However, ISDN videoconferencing does have some limitations. As we discovered in our early trials, the existing studios are frequently configured in a boardroom setting designed to facilitate meetings by videoconference. This is not an ideal configuration for working with young children and families can feel constrained by the setting. Scheduling can also be complicated depending on how frequently the site is used. For example, in some locations the videoconferencing equipment is located in a multi-purpose room that is also used for meetings and events, thereby limiting the availability of the videoconferencing equipment. Finally, most sites charge an hourly fee for the use of equipment and room hire. While fees vary from site to site, the use of ISDN lines is generally the most expensive transmission method used by RIDBC Teleschool.

The 3G pilot project provided a proof of concept for further implementation. Videoconferencing equipment, a modem/router, an aerial and set-up instructions are sent via courier to the family. The equipment is set up by a local installer who contacts RIDBC Teleschool to confirm the installation. The ease of installation facilitates the rate of implementation. Once installation is complete, the family can commence weekly videoconferencing sessions to access the specialist support needed for their child’s sensory disability. Data is transmitted at a rate of 384 Kilobits per second (Kbps). Although higher speeds are possible, this rate is sufficient for videoconferencing and often provides a more stable connection than higher speeds. Families who have had experience with ISDN videoconferencing quickly develop basic technical skills in operating and troubleshooting the in-home 3G equipment. More advanced technical issues can often be resolved remotely by RIDBC staff. This can be achieved by providing phone support to the family or by remotely accessing the settings on the family’s equipment. Families value the opportunity to work in their home environment and this is evident in family participation and child engagement. While the up front costs for equipment and installation can be significant, the equipment can be re-allocated as families leave the program.

The introduction of high speed broadband has led RIDBC Teleschool to explore yet another transmission method. Broadband technology is being used in two distinct ways: with computer-based conferencing and with dedicated videoconferencing systems. Computer-based videoconferencing takes place using programs such as Skype or Sightspeed. Families use their own Internet connection to download one of these programs onto their computer. If necessary, RIDBC Teleschool will provide families with a webcam. The effectiveness of this method relies on the speed of the family’s Internet connection. As with 3G/NextG
technology, the preferred rate of transmission is a symmetric speed of at least 384Kbps. Since many home Internet services have asymmetric upload and download speeds, it can be difficult for families in regional and remote areas to attain the necessary speeds. Also, home Internet plans can be limited by the amount of data that can be downloaded. As videoconferencing transmits large amounts of data, families can find they quickly reach their monthly download quotas.

Alternatively, some families may use a dedicated videoconferencing system with their own broadband connection. In this setup, the camera is connected to the family’s Internet rather than a 3G modem/router. The family enters a specified IP address into the camera’s address book and can then connect directly with RIDBC Teleschool. Although using a dedicated videoconferencing system with broadband can result in similar issues to computer-based videoconferencing, there are also some distinct advantages. The picture quality of the dedicated camera is superior to a webcam. The dedicated camera also has a greater range of pan/tilt/zoom features, which enhance the videoconference. Furthermore, RIDBC staff can control the dedicated camera remotely. This functionality alleviates the technical concerns of many families. Broadband transmission is by far the least expensive option currently available to RIDBC Teleschool. Unfortunately, broadband access is currently limited in most regional and remote areas. The implementation of the National Broadband Network will hopefully result in greater availability of broadband service in these areas and ultimately, an increase in the use of this transmission method for videoconferencing.

<table>
<thead>
<tr>
<th>Year</th>
<th>Transmission method</th>
<th>Location</th>
<th>Equipment</th>
<th>Installation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>ISDN</td>
<td>existing studios at hospitals or community health centres</td>
<td>Dedicated videoconferencing equipment</td>
<td>N/A (sites already established)</td>
</tr>
<tr>
<td>2010</td>
<td>3G/NextG</td>
<td>in the family home</td>
<td>Router/modem, 3G SIM card, aerial, dedicated videoconferencing equipment</td>
<td>four to nine weeks</td>
</tr>
<tr>
<td>2010</td>
<td>Broadband with computer based videoconferencing, e.g., Skype</td>
<td>in the family home</td>
<td>Home Internet connection, computer, webcam and videoconferencing program</td>
<td>immediate</td>
</tr>
<tr>
<td>2010</td>
<td>Broadband with dedicated videoconferencing system</td>
<td>in the family home</td>
<td>Home Internet connection, dedicated videoconferencing equipment</td>
<td>one to four weeks</td>
</tr>
</tbody>
</table>

Table 2 - Telecommunications technologies currently in use at RIDBC Teleschool

OUTCOMES

Since 2002, RIDBC Teleschool has used telecommunications technology to connect more than 250 families to much-needed support for their child’s sensory disability. Over 100 of these families have benefited from in-home videoconferencing. Family satisfaction is evaluated annually through an anonymous survey. In a recent survey, 97 surveys were sent out to families enrolled in RIDBC Teleschool. 52 of these surveys were returned, with all
families indicating that RIDBC Teleschool has made a difference in their lives and they would recommend the program to others.

As a direct result of engagement in this program, families demonstrated greater confidence concerning their child’s sensory impairment, improved their knowledge and understanding of sensory impairment, developed a sense of empowerment in supporting their child's needs and strengthened family and child competence through increased communication. 100% of the families responding expressed the benefit of accessing a service that offers expert knowledge and specialised resources while reducing the burden of travel on the family.

These families also indicated that RIDBC Teleschool provided guidance, and ongoing, regular support for their child’s sensory disability, which made them feel less isolated in their regional and remote communities. Families appreciated the immediacy of feedback resulting from the real-time transmission of audio and video of both the child and the professional. The staff at RIDBC Teleschool also value this two-way communication as they are able to make more timely and responsive therapy recommendations based on their own observations rather than relying on the reports of others.

The range of benefits reported by families could not have been achieved without the increased accessibility provided by telecommunication technology. In fact, families have indicated that their experience with videoconferencing has been so positive that they would value the use of the telecommunications technology to access specialists in other disciplines.

**CONCLUSION**

RIDBC Teleschool has pioneered innovative uses of telecommunications technologies in an effort to overcome the barriers of distance, geographic isolation and inequity of access. By reflecting on the challenges that exist for families in regional and remote areas and exploring possible solutions, RIDBC Teleschool has developed a model of service delivery that provides regular, intensive specialist support for children with sensory disabilities. The success of RIDBC Teleschool clearly demonstrates the tangible benefits that telecommunications technologies can bring to those living in regional and remote areas.

Prior to the mainstream acceptance of telecommunications technologies, families living in regional and remote areas of Australia were at a distinct disadvantage with regard to accessing support for their child’s sensory disability. The challenges typically faced by professionals in remote communities, e.g., vast distances, large caseloads and diverse client needs, made it difficult for those communities to provide the range and quality of services needed by children with sensory impairment. In addition, staff in regional and remote areas often felt isolated and lacked opportunities for ongoing professional development resulting in higher staff turnover in those areas (Ludlow 2008). These circumstances meant that families frequently had to access support in alternative ways, such as correspondence courses or travelling great distances to the nearest major city.

The availability of telecommunications technologies means that families can now access experts in the field of sensory disability regardless of their location. Families are able to receive greater continuity and consistency of services as staff based in metropolitan areas have lower rates of turnover than regional and remote communities (Ludlow 2008). Families no longer face restricted choices for supporting their child’s sensory impairment. Families can now access professionals who have the experience, specialist qualifications and knowledge of specific subspecialty areas that were not previously available to them.

RIDBC Teleschool is constantly striving to find new and innovative ways of supporting children with sensory disability and their families. For the last ten years, RIDBC has focused on the innovative use of telecommunications technologies to address the needs of families in regional and remote locations. Investigation and evaluation of various transmission methods has led to quicker and easier installations for families as well as more reliable connections. With further advancements in telecommunications technology, such as high-definition capability and the National Broadband Network, an increasing number of families in regional
and remote areas will be able to access specialist disability support without leaving their homes. In the future, a model similar to that of RIDBC Teleschool could be applied to many other areas of disability, health care and education thereby eliminating the barriers of distance and inequity so frequently faced by families living in regional and remote locations.

REFERENCES:


