

Project report

Palestinian Telemedicine Rehabilitation Network

PalRehab.net

Implementing a Telemedicine Rehabilitation
Network between the four National Rehabilitation
Centres in the West Bank, Jerusalem and Gaza

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Summary: The main goal of this project has been to establish the first National Telemedicine Rehabilitation Network in Palestine, linking the four National Rehabilitation Centres to each other and to relevant rehabilitation competence abroad. The four centres are:

- Patients Friends Society K. Abu Raya Rehabilitation Centre, Ramallah
- Jerusalem Princess Basma Centre for Disabled Children, Jerusalem
- Bethlehem Arab Society for Rehabilitation, Beit Jala
- El Wafa Medical Rehabilitation Hospital, Gaza

The network has been established through backbone infrastructure supplied by Palestinian service providers and has provided the centres with internet access and sufficient bandwidth suitable for video conference.

Establishing this network has strengthened the Palestinian rehabilitation centres by improving the services to the population. The network has together with internet-based education provided the necessary tools for a support system for institutional capacity building, for the education of rehabilitation staff and for implementing quality development programmes.

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Preface

Acknowledgements

We would like to express our appreciation to the Middle East Section of the Norwegian Ministry of Foreign Affairs for providing the main funding for this project. We would also like to express our thanks to the Norwegian video conference equipment manufacturer, Tandberg, for the donation of four video conference units to the Palestinian rehabilitation centres. Furthermore we would like to express our thanks to Diakonia and the Norwegian Association of Disabled for providing additional funding for the development of rehabilitation e-learning content.

Background

A major challenge to the national rehabilitation sector in Palestine is to ensure that existing expertise and services are used optimally and function as a part of a holistic system. The political situation in the area, in particular the presence of roadblocks and difficulty in obtaining travel permits and the building of the separation wall, makes it complicated for professionals of the four rehabilitation centres to meet and to make use of each other's expertise and experience.

This situation, which has worsened since the start of the second Intifada in September 2000, makes cooperation and coordination between the centres, as well as between the centres and the local community based rehabilitation (CBR) programme, almost impossible. The restraining situation increases the general feeling of isolation inside Palestine and separation between the West Bank and Gaza. As a result, the development of a unified rehabilitation programme and effective referral system in Palestine is hindered and there is unequal access to rehabilitation services.

In 2004, the four rehabilitation centres approached the Norwegian Centre for Telemedicine (NST, now named the Norwegian Centre for Integrated Care and Telemedicine), through the Norwegian Association of Disabled (NAD) to look into the possibility of using telemedicine and eHealth technologies to help them overcome the isolation caused by travel restrictions imposed upon them by the Israeli government. The aim of the pre-project was to investigate the possibilities for establishing a national telemedicine rehabilitation network in Palestine.

The project "Implementing a Telemedicine Rehabilitation Network in Palestine" is based on the report from the September 2004 study, "Breaking the Wall with Telemedicine", <http://www.telemed.no/getfile.php/128965.357/Breaking+the+Wall+with+Telemedicine.pdf>.

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1 Introduction

Patient Friends Society K. Abu Raya Rehabilitation Centre in Ramallah, Bethlehem Arab Society for Rehabilitation in Beit Jala (Bethlehem), Jerusalem Princess Basma Centre for Disabled Children in Jerusalem and El Wafa Medical Rehabilitation Hospital in Gaza City constitute the four rehabilitation hospitals in Palestine. They are an important part of the national rehabilitation sector and the only providers of specialized rehabilitation services to disabled Palestinians in the West Bank, Gaza and Jerusalem. The hospitals have divided the specialties between them and are all part of a national referral system.

The travel constraints implied on the Palestinian population also apply to patients in need of professional rehabilitation as well as the health care professionals of the four rehabilitation centres. The possibilities to meet and to make use of each other's expertise and experience are in many cases limited.

A feasibility study funded by Innovation Norway and the Atlas Alliance was performed by the Norwegian Centre for Integrated Care and Telemedicine and Sunnaas Hospital in September 2004. The purpose of the study was to look into the possibility of using telemedicine and eHealth technologies to help the national rehabilitation centres in Palestine overcome the isolation caused by travel restrictions imposed upon them by the Israeli government. The aim of the pre-project was to investigate the possibilities for establishing a national telemedicine rehabilitation network in Palestine.



Based on the report from this study, "*Breaking the Wall with Telemedicine*"¹, a project description and an application for funding were accepted by the Ministry of Foreign Affairs in late 2006. The main objective of the project has been to establish the first National Telemedicine Rehabilitation Network in Palestine. This network is now linking the four national rehabilitation centres in Palestine to each other and to relevant rehabilitation centres abroad.

1.1.1 Project period

The project was established in November 2006 and the initial project period was scheduled from the beginning of 2007 until the end of 2008. Because of various obstacles described in this report, the project period was extended two times, and ended by October 31 2009.

1.1.2 Project partners

As an institutional capacity building project, the direct target group has been the staff of the four rehabilitation centres. The aim of the centres is to provide, whenever possible, specialized services on a short-term basis with the client returning to the CBR system after discharge from the centre. The centres are:

Patients Friends Society K. Abu Raya Rehabilitation Centre (KARRC) located in Ramallah became Palestine's first rehabilitation hospital in 1990 as a result of Swedish financial and technical support. KARRC is the national rehabilitation



¹ The report can be found here:
<http://www.telemed.no/getfile.php/128965.357/Breaking+the+Wall+with+Telemedicine.pdf>.

hospital for adults and children with spinal cord injuries (SCI) and spina bifida (SB). It also treats patients with brain injuries. The hospital has 27 beds and, until the period of the second Intifada, provided outreach services for discharged patients. KARRC is currently developing two new projects, a surgical/orthopaedic inpatient unit for children and a school for rehabilitation nursing.

Bethlehem Arab Society for Rehabilitation (BASR) in Beit Jala (Bethlehem) originally



established in 1960 as a home for disabled children and developed into a rehabilitation hospital in 1988, provides intensive and comprehensive rehabilitation services for both children and adults with special needs at centralized and decentralized levels.

BASR is the national referral hospital for patients with brain trauma and also treats orthopaedic injuries. It has 90 beds, five rehabilitation sections, one of which is for children with a variety of diagnoses. Other activities include day care provision for 700 children, some of whom are disabled, and the provision of in-kind technical aids such as wheelchairs.

The Jerusalem Princess Basma Centre for Disabled Children (JCDC) in Jerusalem,

founded in 1965, has been earmarked for serving disabled children in Palestine within the structure of the CBR programme. JCDC's main activities include diagnosis, investigation, and formulation of treatment programmes for disabled children with specialized needs.



Services are provided primarily to children and young adults living in East Jerusalem and the central and northern areas of the West Bank (and Gaza when travel to Jerusalem is permitted) through the rehabilitation hospital itself and its outreach clinics in Ramallah and Nablus, with the aim of integrating disabled children into their communities.

JCDC actively involves family members as partners in the assessment, treatment and rehabilitation process. It also offers integrated educational programmes for disabled children and vocational training opportunities for disabled adults in East Jerusalem.

El Wafa Medical Rehabilitation Hospital (El Wafa for short) in Gaza started in 1996 as the only centre specializing in rehabilitation medicine. It has 52 beds, mainly for patients with CVAs, TBIs and SCIs, and two outreach programmes.



Despite the central role El Wafa plays in providing rehabilitation services in Gaza, it has few rehabilitation specialists among its medical staff and, due mainly to the political situation, has few possibilities for input and/or exchange programmes with the other rehabilitation centres in Palestine.

Norwegian Centre for Telemedicine (NST), Tromsø, Norway

NST has long experience within the telemedicine field and many NST pilot projects have resulted in telemedicine becoming a standard in more and more hospital departments. Due to NST's unique experience, the centre was designated as the first World Health Organization (WHO) Collaborating Centre for Telemedicine in 2002 (<http://www.telemed.no/who>).² NST's activities cover all the major aspects of telemedicine. Its collaboration with WHO includes country work, research and dissemination, distance

² A WHO collaborating centre is a national institution designated by the WHO Director-General to form part of an international collaborative network carrying out activities in support of WHO's mandate for international health work and its programme priorities.

learning, advisory services and resource mobilization. NST is the manager of the telemedicine project.

The Norwegian Association of Disabled – Diakonia (NAD/Diakonia)

NAD/Diakonia has extensive experience in development cooperation, Community Based Rehabilitation (CBR), and organizational development. NAD and Diakonia have together many years' experience within the field of disability and rehabilitation in Palestine and have firsthand knowledge about each rehabilitation centre and about Palestine in general.

Sunnaas Rehabilitation Hospital (Sunnaas)

Sunnaas is the national rehabilitation hospital in Norway and has extensive expertise in many areas of specialized adult rehabilitation. Sunnaas has also been working in Palestine with their Quality Development Programme (QDP) together with NAD/Diakonia for many years. Sunnaas also has many years' experience in applying telemedicine in rehabilitation.

Tandberg

Tandberg is one of the world's largest manufacturers of video conference equipment, and is located in Norway. Tandberg has been in the forefront of the development of video conference solutions and has been working within the health area for many years.

1.1.3 Partner roles

Agreements have been set up between the project partners defining their roles and responsibilities. These agreements have also covered financial and legal aspects. An example of an agreement is enclosed in Appendix 2, Sample Contract.

The Rehabilitation Centres

In addition to being the target group in this project, the rehabilitation centres have also played an active role and provided valuable input and assistance to the project. The main responsibilities for the centres have been:

- Coordinating financial and administrative matters related to this agreement with the NST project manager
- Appointing a dedicated person to act as the local project coordinator responsible for project feedback and follow-up
- Appointing a dedicated person to act as the local clinical coordinator
- Appoint a video conference "super-user"³
- Providing the necessary secure storage and correct use of the installed equipment
- Updating NST staff with relevant information regarding the progress of project activities
- Assisting in the development of routines, practices and sustainability plans

The project has made a financial contribution to the centres for the local coordinators and the super-users. This contribution has been the equivalent of a 20% position for each person appointed. In some cases all of these functions have been covered by the same person at each centre.

³ By "super-user" we mean a person acting as the local technical and administrative contact person. A "super-user" also receives extra training in the use of the equipment and will act as the local support person responsible for the daily use of the equipment.

Norwegian Centre for Telemedicine (NST), Tromsø, Norway

NST has been responsible for the overall project planning and management. This has included regular reporting to NST management and the MFA.

The Norwegian Association of Disabled – Diakonia (NAD/Diakonia)

NAD has provided valuable professional input during the project period. In addition the NAD/Diakonia office in Jerusalem has had a role as local facilitator in Palestine. Until May 2009, NAD/Diakonia also provided necessary logistic support. Furthermore NAD has provided some additional funding for the development of elearning content.

Sunnaas Rehabilitation Hospital (Sunnaas)

Sunnaas has been the main provider of e-learning content and video conference lectures. The use of telemedicine has been integrated as a part of the follow-up of the QDP at the rehabilitation centres.

All activities undertaken by Sunnaas have been overseen and partly financed by NAD/Diakonia.

Tandberg

Tandberg has donated four state-of-the-art video conference units and has arranged shipping and handling. This has been done via their Israeli partner in Tel Aviv.

2 Project implementation

2.1.1 Project goals

The overall project goals can be described as follows:

- To install the national telemedicine rehabilitation network between the centres and international parties.
- To install the necessary telemedicine equipment in the centres.
- To develop routines and practices for collaboration between the centres and with international parties.
- To develop the content of training programmes for rehabilitation staff.
- To develop a sustainability plan for the rehabilitation network after the project is over, including planning and evaluating income-generating activities established through the project.

2.1.2 Project objectives

The main objective of the project has been to establish a telemedicine rehabilitation network



in Palestine linking the four national rehabilitation centres to each other and to relevant rehabilitation expertise abroad. This includes the implementation of relevant internet access, installing video conference equipment, installing computers and establishing electronic classrooms for lecturing and internet-based education. Together with Sunnaas Hospital, the project has aimed at developing content of training programmes for hospital staff.

An important part of the project has been to assist in developing routines and practices for collaboration between the centres and with international parties.

The development of sustainability plans has been emphasized throughout the project period. This has included planning and evaluating of possible income-generating activities.

2.2 Project management

2.2.1 General

The project has been divided into three Work Packages (WPs):

- Work Package 1 – Project Management
- Work Package 2 - Technical identification, implementation and training
- Work Package 3 - Develop routines, practices and sustainability plans

The Work Packages have been managed by the project manager. The different responsibilities for the partners have been defined through separate contracts. The contracts have also defined all financial issues related to this.

2.2.2 Work package 1 - Project Management (PM)

The project management has had the overall responsibility for the implementation and the progress of the project. This has included:

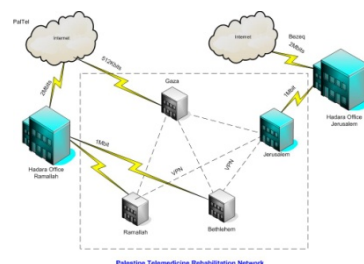
- Negotiating and signing contracts with the centres and commercial partners
- Channelling all funds to the centres and other partners
- Regular follow-up of the progress of the work packages
- Producing regular reports to NST management and the MFA on progress and financial status in cooperation with the other WPs
- Conducting regular meetings with the involved parties. These meetings have been held both on site and by video conference
- Assisting in and performing activities implemented through WP2 and WP3.



2.2.3 Work package 2 - Technical identification, implementation and training

Network and Equipment

WP2 has included mapping of the current technical infrastructure within the four hospitals. The goal has been to clarify the status and identify the needs for change and adaption to the telemedicine network. Agreements have been signed with the commercial partners for the delivery and implementation of network and telemedicine equipment.



In cooperation with the commercial partners and the local telecommunication partner in Palestine, the actual implementation of the telemedicine network has been carried out. The network consists of dedicated broadband lines suitable for computer and video transmission. Each hospital has been equipped with video conference units with

necessary accessories including portable trolleys. This means that the equipment can be moved around and used where it is best suited.

The implemented network is also used as a computer network accessing digital information including relevant e-learning content. Each centre has been equipped with four computers and an electronic classroom has been established. This classroom is primarily intended for use by the local staff when carrying out the internet-based education.



Most of the computer equipment has been obtained locally in Jerusalem and on the West Bank. All computers have been acquired from companies in Ramallah and distributed from there to the other centres, except to Gaza. This is also true for most of the needed accessories. Only a few items had to be obtained in Jerusalem and then transported to the West Bank. The trolleys for the video conference units were hand made in Ramallah.

Training

Multiple training programmes with the relevant staff have been carried out. This training has covered both the use of the video conference system and how to access the internet-based information.

A local “super-user” has been appointed at each centre. This person has had the overall responsibility for the installed equipment, ensuring that it has been taken good care of. The super-user has also received extra training and is working as the local technical contact.

2.2.4 Work package 3 - Develop routines, practices and sustainability plans

Developing and establishing routines and practices as well as the coordination of the services has been an ongoing process. The object has been to create the necessary understanding and awareness both within and between the centres. This has been done by focusing on ongoing plans ensuring, that both the management of the centres and the staff have a common understanding of the challenges and possibilities using the telemedicine services. Furthermore, it is of great importance that these areas will be followed by clear commitments from each party.

Bethlehem Workshop

One important part of this work was arranging a workshop, which took place at the Bethlehem University in September 2009. The main goal for this workshop was to assist in developing a mutual understanding and agreements for use of telemedicine services.



A strong focus on the importance of organizational commitment is the only way to ensure a successful and sustainable use of the services. The workshop objectives can be summarized as follows:

- To reach a common understanding regarding the future use of the installed equipment
- To define areas of cooperation
- To commit the parties to the use of the services
- To establish organizational routines, define regular meetings, and agree upon time schedules

The above-mentioned topics are of great importance in the development of sustainability plans. Equally important are the financial issues regarding the monthly fees of the network and the maintenance of the equipment. Work has been started on the development of

income plans and routines whereby other health institutions and organizations can benefit from the use of the centre's telemedicine network.

2.2.5 Visits - Meetings

To follow up the local activities, the project manager has visited the centres on a regular basis. The number of visits has been around four each year. The purpose of these visits has been to:

- Follow up planned activities at the centres
- Plan new activities
- Follow up agreements with the local suppliers
- Monitor the network implementation process
- Install equipment
- Provide training

On average, the visits have lasted eight days and have included visits to the three centres in Jerusalem and on the West Bank. A number of attempts have been made to obtain travel permits to Gaza, but due to the closure it has not been possible to make any visits to El Wafa hospital. All contact with El Wafa has therefore been by electronic means such as telephone, video conference and e-mail.

3 Challenges

3.1.1 Local follow-up

Our experiences from Norway show that the implementation of these types of projects can be a long-term activity requiring close local follow-up. This was also expected to be the case in Palestine. The project tried to hire a local project coordinator early on. The project was looking for a person with good technical and administrative skills, preferably with a clinical background. The process was not successful because it was not possible to find suitable candidates. The decision that the project manager should do the follow-up from Norway was therefore made. Plans were made for regular visits by the project manager and other staff from NST and Sunnaas, and work plan agreements for the periods in between were set up.

Because of the situation at the rehabilitation centres, which were somewhat understaffed and lacked financial support from time to time, this arrangement did not work as well as expected. This is one of the factors causing the adjustment of the length of the project period.

During the last five months of the project and especially during the planning of the Bethlehem workshop, it was necessary to have tight local coordination and follow-up. To ensure proper finalization, a local coordinator was hired for this purpose. The coordinator joined the project from May 2009 until October 31.

3.1.2 Network providers

At the time of project initiation there were a limited number of possible network providers and they all were either owned by or dependent on the Palestinian national telecom provider, PalTel. PalTel was, and to large extent still is, the only provider of backbone infrastructure. PalTel is the main owner of relevant Internet Service Providers (ISP), and these ISPs depend solely on PalTel for their add-on services.

The use of video conferencing involves certain network capacity requirements that are not always easily available, at least not at an acceptable cost. A normal low-cost ADSL connection is not suitable for this purpose. A contract was signed with Hadara, a PalTel subsidiary, and full duplex SDSL lines were chosen.

3.1.3 *Shipment of video conference equipment*

The shipment and import of technical equipment, especially electronics, to the Palestinian Territories is not a simple task. The rules implemented by the Israeli customs can make this a long-term assignment, and the outcome is highly uncertain. It was therefore decided to implement a temporary video conference solution and spend some time looking for other options.



The temporary solution installed at the centres was obtained locally and consisted of computer software and a small video camera. This solution was used for approximately one year and worked satisfactorily.

During this period, different ways of shipping the video equipment were investigated, including shipping through the Jordan Free Zone. This proved not to be successful and the equipment was stuck in Amman for a period of time before it was possible to return it to Norway.

After some time Tandberg managed to solve the import issues and the equipment was finally shipped from Norway through their Israeli partner in Tel Aviv. An additional two months were needed to get one unit into Gaza.

3.1.4 *The Gaza situation*

The import/export blockade of Gaza has put an effective stop to access to most of the goods needed in the region. This is especially true for electronic equipment such as LCD screens, computers and computer network equipment. The choices of computers and network topology were therefore much more limited compared to the West Bank, even if such limitations also exist there.



In cooperation with Hadara and their local branch in Gaza, we managed to find some computer equipment locally. The computers were not up-to-date, but they have been installed in the same manner as for the other centres. The video conference unit for El Wafa Hospital has also been successfully installed. Unfortunately, the hospital wing where the audio/video room was situated was bombed and destroyed during operation Cast Lead, but the equipment has been safely installed temporarily in another hospital wing.

3.1.5 *Partner withdrawal*

Initially discussions were held with two commercial partners, Tandberg and Cisco Systems. Cisco Systems is the world-leading manufacturer of computer network equipment. They showed a great interest in this project at a very early stage. An agreement between the project and Cisco was made, covering the delivery of state-of-the-art network equipment free of charge. The agreement also included local assistance by Cisco experts through their local partners.

Shortly after the project was initiated, Cisco withdrew from the agreement. One of the reasons for this was that US policy at that time forbade American commercial companies

from having direct interaction with and giving donations to NGOs in the Palestinian Territory. A number of different possibilities were discussed, but to no avail. The result was that the project had to buy the network equipment through the local provider, and ironically the equipment implemented was of Cisco brand.

This was a setback for the project, resulting in the use of partly out-of-date equipment at a higher cost.

3.1.6 Sustainability

A strong focus on the importance of organizational commitment and long-term planning is the only way to ensure successful and sustainable use of the services. For this reason, a workshop was arranged in Bethlehem in September 2009. The output from this workshop will have an important influence on the development of sustainability plans. The purpose of this workshop was therefore to assist in developing a mutual understanding and setting up agreements for using the telemedicine services and strengthening the cooperation of all four centres.

The overall output from the workshop can be summarized as follows:

- Further development of cooperation through telemedicine within the clinical, administrative and educational fields
- Establish procedures for regular telemedical activities
- Secure rooting of services through increased internal activities with special focus on telemedicine.
- Map out potential new international partners for lectures, guidance and competence exchange.

Regular use of the telemedicine equipment through mutual agreements contributes to a better understanding of the use of the equipment as well as a wider range of use. The possibility of using telemedicine services to overcome travel constraints imposed on both medical staff and patients cannot be valued highly enough. The workshop showed that the centres have a good understanding of this, and routines for discussing patient cases and patient treatment are established.

The following e-mail copy illustrates the importance and the potential for the use of the equipment, and shows that the implemented routines are followed up.

Dear Jan-Hugo,

Greetings from the Jerusalem Princess Basma Center for Disabled Children!

Yesterday Monday 23 November 2009 we had a new Telemedicine event. A lecture was given by Ilana Nevill, a practitioner from France, on the Feldenkrais method. The lecture was about the functional integration in Neuro-rehabilitation through playful learning. The presentation was given in English and was accompanied by short film document on DVD which was also shared on video with the participants.

Therapists from the Basma Center attended. Also present through video conference were staff from Al Wafa Hospital in Gaza and Abu Raya in Ramallah.

BASR could not attend due to previous commitment.

Many thanks.

Sincerely,

Lina Majaj

The development of sustainability plans also includes reliable and affordable technical solutions. The use of video conference imposes some extra requirements on the network

infrastructure, demanding more expensive solutions than normal computer-based Internet access. Because of the limited numbers of network providers available during the project period, the network options are also limited and the prices higher.

The current monthly line fees covered by the project vary from \$500 to \$1 500. The centres have committed themselves to a continued lease of the network lines, but because the financial situation for the centres has grown worse over the past years it is currently not possible for them to cover for this.

During the last months, a couple of new providers have been established on the West Bank and alternative network solutions are now under testing. These solutions will mainly be based on mobile phone technology at a much lower cost than the leased lines.

4 Project Results

4.1.1 *Outcome for partners*

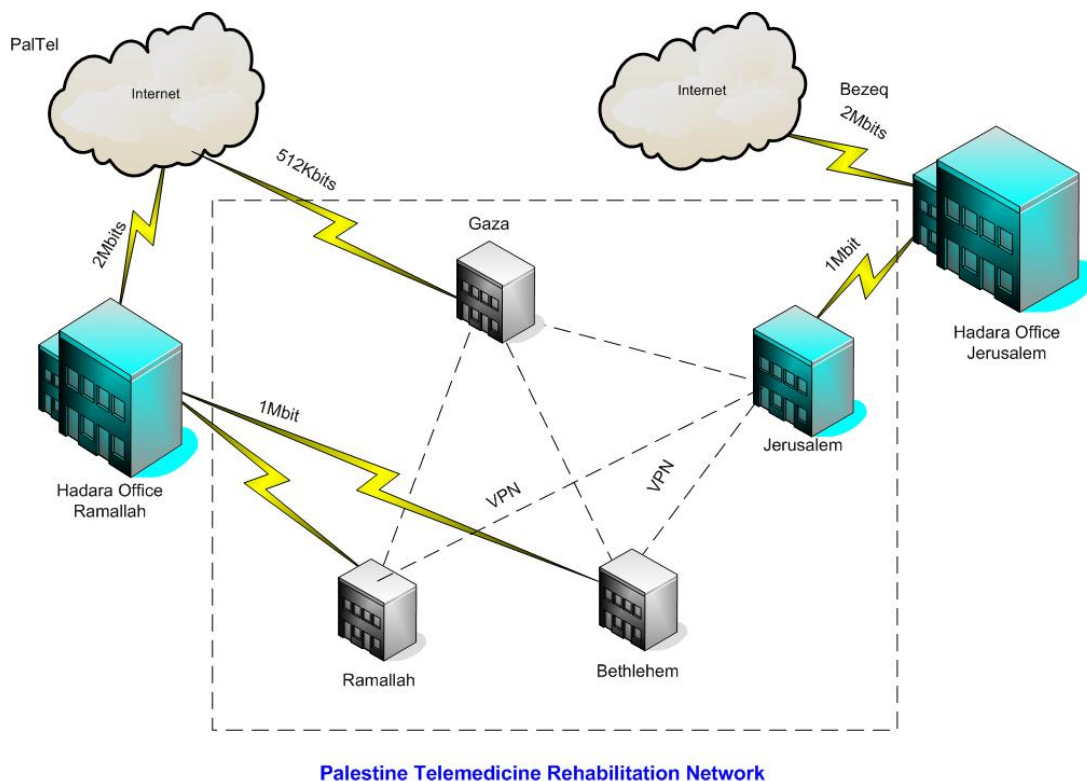
The success of the outcome for the partners can be measured by looking at the original result indicators specified in Appendix 1, Result indicators. The indicators show that most of the project goals have been achieved. The goals can be summarized as follows:

- To install the national telemedicine rehabilitation network between the centres and International Parties.
 - Result: The telemedicine network between the centres and the other partners both on the national and on the international levels has been implemented.
- To install the necessary telemedicine equipment in the centres.
 - Result: All required equipment including the video conference units have been properly installed in all centres and are fully functional.
- To develop routines and practices for collaboration between the centres and with international parties.
 - Result: A mutual understanding and agreements for the use of the services have been established.
- To develop the content of training programmes for rehabilitation staff.
 - Result: Lectures are given between the centres on a regular basis. One e-learning programme has been developed.
- To develop a sustainability plan for the rehabilitation network after the project is over, including planning and evaluating income-generating activities established through the project.
 - Result: Based on the outcome from the Bethlehem workshop, the development of income plans and routines have been initiated.

4.1.2 *Technical outcome*

All technical goals and issues have been resolved. Internet access and access between the centres have been established according to the original plans. The following figure illustrates the implemented network.

Network



In the West Bank and in Jerusalem, the implemented networks consist of full duplex 1Mbits leased lines.⁴ Internet access has been established through both Hadara and Bezeq (Israeli network provider) and the speed is 2Mbits. Because of the situation in Gaza, the network to El Wafa is only 512Kbits per second. The whole network is based on Cisco hardware.

In-house equipment

At each centre an electronic classroom has been established. This consists of four computers all connected through the same local network, and one printer. In addition, one Tandberg video conference unit has been installed together with LCD screens. One of the computers is connected to the video conference unit and to the LCD screen, enabling the transfer of images, text and video. This setup is also used for local lectures.

Training

The local staff has gone through the necessary training in the use of the equipment. In addition, one "super-user" at each centre has received additional training enabling them to give local technical support.

⁴

Full duplex: Same transfer capacity both for download and upload.

Mbits: Megabits per second.

Leased line: Dedicated line (as opposed to an ADSL line, which is shared among many users)

5 Conclusions

A successful implementation of sustainable telemedicine services depends on fulfilment of several criteria. Researchers at NST and the University of Tromsøe have looked at some of the telemedicine projects implemented and have listed some important factors influencing a successful implementation.⁵ Some of these factors are:

- Resolving issues regarding organizational and technical arrangements.
- Recognition of telemedicine as a benefit.
- Perception of telemedicine as a solution to medical and/or political issues.
- Pointing out the importance of establishing guidelines for how to use the system.
- The importance of establishing arrangements for maintainability of the system.

Some of the result indicators specific to this project are related to the above-mentioned factors. A good understanding among the hospital staff in the use and possibilities of the telemedicine services is important and this is especially true on a management level. The more deeply the understanding of these services is rooted at this level, the higher the possibility of success.

All of the centres seem to have a good understanding of this and the services are to a large extent integrated in the daily routines and within different clinical areas. In general, the access to information and second opinion from colleagues at the other centres is simplified.

- The administrative staff at the centres is using the services on a regular basis, arranging meetings discussing common topics and planning common activities. The possibility of discussing common topics and challenges without travelling for hours may contribute to better cooperation between the centres.
- Within the clinical field, the services are used in different ways. The combination of differentiated specialities and the travel constraints imposed on both patients and medical staff create the potential for extended use. The services are being used for discussing general clinical and medical topics together with concrete patient cases. This includes remote diagnosis and remote assistance in treatment of special cases. The value of doing live demonstrations and showing the status of patient treatment cannot be overestimated.
- One of the challenges for the centres has been accessing relevant health information and providing up-to-date learning material. There is always a need for continuous education and access to information regarding patient treatment. With the electronic classrooms, the staff find it easier to achieve this in an organized manner. Video conferencing is used to enable attendance of lectures given by hospitals abroad. The centres have also organized joint lectures and training sessions using the network.

It is the opinion of the project manager that the overall goals and objectives in this project have been reached. However, it would be premature to make any conclusions regarding long term sustainability at this stage. The centres have committed themselves to regular use of the telemedicine equipment through mutual agreements made during the project period and finalized at the Bethlehem workshop. This has also given them a better understanding of the use of the equipment and contributes to a wider range of use.

Because of the nature of this project and the delays described earlier, the development and implementation of reliable sustainability plans will require additional time and work. There are examples of telemedicine projects that cannot be described as successful due to lack of sustainability. It is our opinion that this may be due to lack of close follow-up after the

⁵ "Characteristics of successfully implemented telemedical applications", <http://www.implementationscience.com/content/2/1/25>

implementation phase. We believe that this first phase after a pilot implementation is often absolutely critical and a continued follow-up may be advisable. This will ensure that the services are more deeply rooted within the organization and thus contribute to long-term sustainability.

The next chapter briefly describes some of the future steps that should be taken.

6 Future Steps

During this project it has become clear that there is a need for further development of the telemedicine services. Establishing additional and sustainable routines for the access and mutual sharing of competence, both locally within their own network and with international partners, are of great importance. There is also a need for further development of e-learning content and to make this accessible for health personnel working within the rehabilitation field in Palestine. Some of these issues have already been defined, but there is still a need for further clarification.

Experience shows the importance of local follow-up after the implementation of these types of services. This will ensure that the services are used as planned also after the end of the project. NST would therefore like to establish new project activities for the coming years. These activities may consist of:

- Identifying needs for further development of the existing telemedicine services
- Identifying additional needs for e-learning development and assisting in further development and implementation
- Further assistance in the implementation of services, helping to sustain and expand the use of the infrastructure.

There should also be a focus on assisting the centres in establishing a new low-cost network infrastructure. This will be made possible by the recent establishment of new service providers introducing new technology.

The partners have already revealed their need for e-learning content and training regarding rehabilitation of patients within different categories. Because the areas are very wide and the clinical topics vary accordingly, it is important to identify which fields of rehabilitation to focus on. The actual implementation can be done in various ways, such as blended learning, individual training in front of the screen, and individual training with a certificate.

In addition to the rehabilitation centres, partners in this new project should be Sunnaas Hospital and the Norwegian Association of Disabled together with Diakonia.

7 Appendixes

7.1.1 Appendix 1, Result indicators

The following tables illustrate the outcomes related to the original specification of goals and result indicators.

Goals	Outcome	Quantitative indicators	Outcome	Qualitative indicators	Outcome
The technical expertise of Palestinian rehabilitation centres and coordination of their services are strengthened as a result of establishing the first national telemedicine rehabilitation network in Palestine.	This overall goal has been achieved	Negotiations and contracts with telecommunication and Internet providers exist.	Yes	Key personnel at each hospital demonstrate how to operate the telemedicine equipment.	Yes Extensive training has been performed.
		Internal routines for the use of telemedicine are established.	Yes	Examples are documented in which rehabilitation professionals at the centres share information and discuss common challenges.	Yes
		Palestinian rehabilitation centres and Sunnaas are connected in a telemedicine rehabilitation network.	Yes.	Examples of coordination of specialized services to meet patient needs are documented.	Yes
		Centre management staff conduct monthly meetings with each other by video conference.	Yes.	Centre staff demonstrate the technical skills and knowledge required to care for their respective patient caseloads.	Yes
		The telemedicine network is used by the centres on a weekly basis for training, coordination and cooperation.	Yes	Examples are documented of cooperation between	No

Goals	Outcome	Quantitative indicators	Outcome	Qualitative indicators	Outcome
				<p>JCDC and sister hospitals in Jordan and Israel through the telemedicine network.</p> <p>Examples are documented in which professionals who produce prosthetic devices at JCDC and BASR communicate and discuss cases using the national telemedicine rehabilitation network.</p> <p>Examples are documented in which psychological testing of patients and training of staff in methods for cognitive assessment are carried out between two or more centres in Palestine and/or with Sunnaas.</p>	<p>No</p> <p>Yes</p>

Expected results	Outcome	Quantitative indicators	Outcome	Qualitative indicators	Outcome
The management of the rehabilitation centres have a common understanding of the challenges of the specialized centres in general and of each centre in particular.	Yes	Management meet regularly by video conference	Yes	<p>Examples noted in which management of the centres have cooperated on issues of common interest.</p> <p>Common plans for the development of specialized rehabilitation services exist.</p> <p>Discussions between staff at the different centres about patient cases are documented.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>
A joint virtual professional meeting forum is developed and accessible for all rehabilitation centres.	Yes	<p>A virtual, professional meeting forum has been established.</p> <p>Intra- and inter-professional groups at the centres meet monthly by video conference.</p> <p>The centres have conducted regularly scheduled meetings with Sunnaas in Norway and the Child and Adolescent Habilitation Centre in Sweden.</p>	<p>Yes</p> <p>No</p> <p>Yes</p>	<p>Relevant staff participating in the meetings, discussion groups and professional programmes.</p> <p>Examples of best practice standards of care are made available to the members of the forum.</p> <p>The staff at the centres have access to updated information and news about rehabilitation.</p> <p>Examples are documented of lectures on rehabilitation-related topics held between the centres, as well as with Sunnaas and other centres abroad.</p> <p>Examples are documented in which patients have</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>No</p>

Expected results	Outcome	Quantitative indicators	Outcome	Qualitative indicators	Outcome
				communicated with other patients in their same situation.	
The centres generate income from renting out the video equipment	No	All centres are able to cover 20 per cent of their running costs by renting out the telemedicine facilities.	No	Documentation of examples whereby other health institutions and organizations benefit from the use of the rehabilitation centres' telemedicine network.	No
A joint distance education programme is developed.	Partly	Investigation of the potential for the development of distance education programmes in collaboration with universities and university colleges has been undertaken and documented. The master programme in Gaza uses the national telemedicine rehabilitation network for distant learning and lectures with universities and centres in Australia, UK, Canada and Norway.	Partly N/A	Examples of staff at the rehabilitation centres and students in the field of rehabilitation using distance learning programmes as a part of their professional upgrading and/or education are documented.	Partly

7.1.2 Appendix 2, Sample Contract

**Agreement of Cooperation
Between
The Norwegian Centre of Telemedicine (NST)
And
Princess Basma Jerusalem Centre for Disabled Children (JCDC)**

Introduction

This agreement covers the responsibilities among the two parties in the project:

“Implementing a national Telemedicine Rehabilitation Network in Palestine, PalRehab.net”.

The telemedicine (e-health) project aims to strengthen the capacity of the Palestinian rehabilitation centres by establishing the first national telemedicine rehabilitation network in Palestine. The network will link the four national rehabilitation centres in the West Bank and Gaza to each other and to relevant rehabilitation centres abroad. The centres are:

- K. Abu Raya Rehabilitation Centre, Ramallah
- Princess Basma Jerusalem Centre for Disabled Children, Jerusalem
- El Wafa Medical Rehabilitation Hospital, Gaza
- Bethlehem Arab Society for Rehabilitation, Bethlehem

The aim of the project is to provide a network that will contribute to preventing professional isolation, improving the centres' expertise within the field of rehabilitation, and facilitating coordination of specialized rehabilitation services. Furthermore, the network will contribute to capacity building of the rehabilitation sector by providing a medium for conducting continuing education and training of health care professionals (*e-learning*).

The telemedicine project is a joint initiative of the Norwegian Centre for Telemedicine (NST) and NAD/Diakonia. The project is funded by the Norwegian Ministry of Foreign Affairs, NST, NAD/Diakonia and the private commercial partner Tandberg.

The project period is from the date on which the agreement is signed and ends on the 31st of December 2008.

Purpose and contribution of the parties

The overall purpose of the collaboration between NST and JCDC (hereafter referred to as the parties) is to ensure that JCDC will be integrated in the dedicated ICT network that will be implemented between the four national rehabilitation centres in Palestine. NST has overall project management responsibility for the telemedicine project, and is responsible for technical liaison between commercial partners and JCDC.

Lines of communication

Unless otherwise agreed by the parties, the primary line of communication in relation to the agreement will be between the project coordinator at NST and the JCDC local project coordinator. The project coordinators are specified in attachment number two.

Responsibilities of the parties

NST will be responsible for the following:

- Liaise with the JCDC local project coordinator in order to coordinate financial and administrative matters related to this agreement;
- Transfer funds to JCDC in accordance with this agreement;
- In cooperation with the commercial partners install the ICT network and one video conference unit in JCDC
- Conduct the necessary training in the use of the equipment for designated JCDC staff
- Conduct the necessary training in the use and mode of operation of the equipment for the designated super-user
- Provide technical input in relation to coordination of activities under this agreement with other support to the centre and with other relevant activities/partners in the region
- Assist in developing routines, practices and sustainability plans

JCDC will be responsible for the following:

- Liaise with the NST project coordinator to coordinate financial and administrative matters related to this agreement
- Provide technical input and updates with respect to the role of the centre
- Provide technical input in relation to coordination of activities under this agreement with other support to the centres and with other relevant activities/partners in the region
- Appoint a dedicated person acting as the local project coordinator responsible for project feedback and follow-up
- Appoint a video conference “super-user”
- Provide the necessary secure storage and correct use of the installed equipment according to guidelines described in attachment number three.

- Update NST staff with relevant information regarding the progress of project activities
- Provide logistics support to NST staff in Jerusalem when necessary
- Assist in developing routines, practices and sustainability plans

Financial arrangements

NST will contribute an initial contribution to the centre for the designated super-user staff. This contribution will correspond to a 20% position for 17 months, whereof 5 months will be payable in 2007 and 12 months will be payable in 2008. For this year the payment will be done latest at the end of August 2007, and for 2008 latest at the end of March 2008. The total amount to be paid will be USD 3.400,-.

NST will pay for the installation of the ICT network and the monthly fees for the network lines during the project period.

Attachments

The following documents will serve as attachments to this Agreement:

- Attachment number one: Work plan
- Attachment number two: Contact Form
- Attachment number three: Equipment specification and guidelines

For 2008, the Work Plan shall be jointly discussed and agreed upon within the 10th of December 2007. The current work plan, including expected results and indicators, will be jointly reviewed as per the 30th of August of the year in progress.

Evaluation

An internal review of the collaboration will be conducted at the conclusion of the period covered under this agreement.

Copyright and ownership

The copyright and ownership of all documents prepared by both parties under this agreement will remain with NST and may be freely used by both parties without any form of payment. Both parties agree to mention each other when they refer to the project in their oral and written communication.

Handling of disputes

Any dispute in connection with this agreement, which cannot be solved in mutual consultation, shall be settled by the Norwegian Courts and in accordance with Norwegian law.

Termination of Agreement

NST reserves the right to terminate this agreement in case JCDC does not follow up their obligations according to this Agreement. This termination will include the withdrawal of the donated equipment and cancellation of the monthly fees for the ICT network. In case of force majeure this termination will not be carried out.

Duration of agreement

This agreement will be valid from the date on which the agreement is signed. Unless otherwise agreed by both parties in writing this agreement will expire on the 31st of December 2008.

_____/_____
Place and date

_____/_____
Place and date

Norwegian Centre for Telemedicine
Dr. Steinar Pedersen

Princess Basma Jerusalem Centre for Rehabilitation

Head of Department

7.1.3 Appendix 3, Agenda and Participants Bethlehem Workshop

Telemedicine Rehabilitation Network Workshop Bethlehem 29.09.09 – 1.10.09

Overall aim:

Develop a mutual understanding and agreements for use of telemedicine services.

Day I Tuesday September 29		
Time	Session	Responsible
10.00 – 11.00	Introduction and project status <ul style="list-style-type: none"> • Welcome and Introduction • State of Affairs • Challenges 	NST – Jan-Hugo Olsen
11.00 – 11.15	Short break – Coffee/Tea	
11.15 – 12.45	Participants' presentations <ul style="list-style-type: none"> • What has been achieved • How can each one contribute • Expectations for the future 	All Centres
12.45 – 13.00	Sum up presentations	NST
13.00 – 14.00	Lunch Break	
14.00 – 14.45	Challenges when implementing telemedicine services <ul style="list-style-type: none"> • Implementing new routines • Agreements • Training 	NST – Eirik Øvernes
14.45 – 16.15	Group discussions	All
16.15 – 16.30	Summarize	

Day II Wednesday September 30		
Time	Session	Responsible
09.30 – 10.00	Summarize Tuesday meeting	NST - All
10.00 – 11.30	Group discussions continue	All Centres
11.30 – 11.45	Short break – Coffee/Tea	
11.45 – 13.00	Group Presentations	All
13.00 – 14.00	Lunch Break	
14.00 – 15.30	Plenary discussion <ul style="list-style-type: none"> • Mutual understandings • Agreements 	All
15.30 – 15.45	Short break – Coffee/Tea	
15.45 – 16.40	Summarize & Close	NST - All
18.00 -	Dinner at "La Terrace" restaurant in Bethlehem	All

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Participants Bethlehem Workshop

Institution	Name	Position	Comments
JCDC	Dr. Waddah Malhis	Medical Director	
	Mr. Adel Khateeb	IT Specialist	
	Lina Majaj	Executive Secretary	
	Razan Abul Hawa	Medical Secretary	
KRRC	Mrs. Naheel Fatafteh	Head of Nursing Dep.	
	Mr. Ibraheim Adel	IT specialist	
	Mrs. Rasha Abed	Occupational therapist	
	Mrs. Wafa Basalat	Physiotherapist	
BASR	Mr Imad Abu Mohor	Dep. Exec. Director	
	Suha Awwad	Speech Therapist	
	Mr. Motasem K. Abu Aker	IT Consultant	
NST	Mr. Jan-Hugo Olsen	Project Manager	
	Mr. Eirik Øvernes	Specialist Consultant	
	Ms. Bana Abdeen	Project Coordinator	
Diakonia	Mrs. Ghada Harami	Rehab. Progr. Director	

