

# Proposed New Caledonia Telemedicine network

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## Abstract

Healthcare can now be provided from a distance allowing doctors to make a diagnosis or give an opinion on possible treatment without meeting the patient directly. This requires digital imagery via telehealth which is theoretically well suited to New Caledonia's geographic and demographic characteristics. After using video-conferencing with mainland France over a period of several months as part of a continuing medical training programme, it became clear that a telehealth network would improve local health care efficiency and this concept is being incorporated into the Territory's overall health policy. A needs assessment was conducted to assess the expectations of doctors and this highlights the need to develop such a network, as soon as possible. The exact mode of communication has not yet been determined and in this article the expressed needs of doctors and the proposals with advantages and constraints are discussed in legal, ethical, financial, organisational and medical terms.

## Introduction

With the advent of the new communication networks and the use of digital imagery, distance health care has now become a possibility. A patient's medical file, containing text, sound, fixed images such as radiographic records or moving images such as echographs can be transferred almost instantaneously between two practitioners in two different and distant locations. Doctors can make a diagnosis or give an opinion on treatment without actually examining the patient. Many telemedicine networks are now operational throughout the world and have demonstrated their usefulness in case management.

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## The origin of the New Caledonia Telemedicine Network Project

The circumstances prevailing in New Caledonia are an incentive to develop a territorial telemedicine network.

### Geographic and demographic background

With its 18,575 sq. km of land area, New Caledonia is, along with Wallis and Futuna, the most distant territory from mainland France (see Table 1). It is divided into two uneven parts: the main island or *Grande Terre*, surrounded by a multitude of small islands, and the Loyalty Islands: Lifou (1,150 sq. km), Mare (650 sq km), and Ouvea (132 sq. km).

The Referendum Act of 9 November 1988 divided New Caledonia into three provinces: Northern, Southern and Loyalty Islands. At the last census (16 April 1996), the total population was 196,836, but with a very uneven distribution as seen below.

<b>Northern Province:</b>	<b>41,413</b>
<b>Southern Province:</b>	<b>134,546</b>
<i>Noumea:</i>	76,293
<i>Greater Noumea (Noumea, Mont Dore, Dumbea and Paita):</i>	118,823
<b>Loyalty Islands Province:</b>	<b>20,877</b>
<i>Lifou:</i>	10,007
<i>Mare:</i>	6,896
<i>Ouvea:</i>	3,974

### General public health context and health care system

Administrative responsibilities for the health sector were devolved to the provincial authorities under the Organic Law dated 19 May 1999. Higher education, including in particular, training of doctors and scientific research, remains the responsibility of the French government. The same is true for school health. New Caledonia has jurisdiction over social welfare, public hygiene and health, health inspections at the borders and hospital facilities.

At the request of a Provincial Assembly, the Congress can give jurisdiction to provincial authorities to adapt and apply public health and hygiene and social welfare regulations (Article 47, I, 1). The Congress can also grant provincial or municipal authorities jurisdiction to enforce application measures for the regulations which it enacts (Article 47 II).

**Table 1. Distance between New Caledonia and some selected countries**

Distance to	France	Australia	Japan	New Zealand	Tahiti
<b>New Caledonia</b>	20 000 km	1 500 km	7 000 km	1 700 km	5 000 km

In addition to development contracts, the French Government annually grants the Provinces an overall operating allotment. This operating allotment is equal to the total amount of money received from the French Government, excluding development contracts, either directly as free medical assistance for the elderly, state wards, the handicapped; for public primary schools and for junior high school operations, or indirectly, through New Caledonia's budget for health and public education. (Article 181, III).

Thus, by delegation, the Provinces organise their own health care systems, prepare their own health and prevention policies and are responsible for procuring their own supplies. They grant medical aid according to their own requirements. Each Province organises and funds medical or medico-social districts around dispensaries with varying levels of human and technical resources, according to each Province's policy.

The private medical sector is also well represented, but is concentrated in the Southern Province, in Noumea and surrounding *communes* in particular. A system for regulating entitlement to public medical insurance reimbursement has had to be introduced by the paying organisations in the area referred to as Greater Noumea. Most medical specialisations are represented in private practice but in Noumea only, except for a cardiologist and radiologist who have recently set up practice in Bourail. Some specialists have secondary surgeries in the rural areas while others pay visits to provincial dispensaries and hospitals.

The centralisation of most medical care specialists and medical evacuation facilities in Noumea isolates other health institutions - whose needs would be simple to meet were they are not so far away.

In addition, Territorial doctors request medical evacuations (to New South Wales in Australia and metropolitan France) for specialised advice and care or for tests which are not available in the Territory.

The social welfare coverage is a patchwork-type system. CAFAT, medical assistance plans and various mutual as well as private medical insurance companies provide primary or secondary coverage in disparate fashion depending on the

risks covered. A proposal for unified social welfare coverage is moving forward.

In addition, access to private medical care is subject to conditions for those entitled to free medical care. The practice of requiring a contribution for each fee is widespread but not general as many patients cannot afford the cost.

Lastly, public transports systems are often non-existent. As these shortcomings still do not justify special medical transport, for many access to care is restricted to the nearest facility.

There are four hospitals in New Caledonia. The Territorial Hospital (CHT) in Noumea is a 462 bed facility which offers short-term hospitalisation. Most medical and surgical specialities are available, except for neurosurgery and heart surgery. Short-term activity is divided between the Magenta site (mother-child and nephrology) and Gaston Bourret (other specialisations, particularly all emergency traumatology). The imaging technical resources include standard radiology, ultrasounds and CAT scanning. Magnetic resonance imaging, radio-isotope and radiotherapy are not available. Some specialisations conduct

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visiting sessions at the Provincial medical clinics and hospitals. A specialised hospital (CHS) located in Noumea which is mainly devoted to psychiatric treatment.

Two hospitals in the Northern Province, located in Koumac and Poindimie, which allow hospitalisation in facilities of 45 and 44 beds respectively. Their short-term activities include medicine, surgery and maternity facilities when fully staffed.

**The ethical obligation**

Four articles of the new code of medical ethics (articles 32, 33, 60 and 71) represent an incentive to set up a telemedicine system in order to be able to comply with the moral obligation of providing the patient the best possible opinion and most suitable technical resources given current scientific progress. The Territory's doctors therefore request external medical evacuations (New South Wales in Australia and mainland France) for opinions and specialist care or examinations that are not available in the Territory.

## Local experience

Videoconferences have been organized between the CHT and the New Caledonia Medical Association locally and with Toulouse University Hospital and the European Institute of Telemedicine of Professor Lareng in Europe as part of continuing professional training. This was an opportunity for each participant to assess the importance of exchanging information between doctors at the multidisciplinary meetings on the diagnoses and treatments required for the cases under discussion.

The foregoing reveals the possibility of interactive transmission of medical files and even distance consultations, which make it possible to offer local case management, credible in terms of security, and reduce the number and duration of medical evacuations which, in addition to the always significant social costs, are mentally taxing for the evacuee.

## New Caledonia Telemedicine (CHT) Network

Meetings were arranged in order to define the needs and techniques required, so as to devise a system which would meet the expectations of the doctors of the various parts of the medical system as closely as possible.

### Outside CHT

Visits were arranged to the Provincial hospitals and in the medical districts of the Loyalty Islands. The doctors we met rapidly set a number of pre-conditions for the project:

- telemedicine should not compete for equipment and staff at the various facilities.
- telemedicine should not reduce the number of decentralised consultations.
- telemedicine should not hinder the computerisation of medical facilities and, even if it did appear objectively useful, some malfunctions would certainly have to be sorted out initially.

The needs expressed were basically the transfer of x-ray images and ultrasounds for further opinion (no radiologists locally available or in decentralised consultations) and the participation of hospital staff in continuing medical training, but also to achieve the goal of reducing the isolation of rural and outer-island doctors. No interest was expressed in transferring ECGs, for which the fax is effective enough.

### At CHT

Discussion revealed the difference between territorial

and extra-territorial needs. On the territory, the opinions of the CHT doctors reflect those of provincial doctors and medical facilities in requiring the transmission of x-ray images and the use of videoconferences to set up a very efficient communication system making it possible to assist hospital staff, perform practical training (emergency and resuscitation work) and consultations.

The departments which were the keenest to develop this type of communication were paediatrics, pneumology, nephrology, neonatology, gynaecology/obstetrics and imagery. The cardiology department and the emergency services would like assistance in heart emergencies through the transmission of ECGs.

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Outside the territory, the most developed services are case management help for neurosurgery (neurology, orthopaedics and anaesthesia and resuscitation depart-

ments) through the transmission of scanner image slices and the possibilities for assisting staff from a range of disciplines and in particular from cancer centres (medicine, pneumology, ENT, gynaecology, neurology) or foeto-pathology. The transmission of imagery is also in demand by neurology, orthopaedics, imagery and paediatrics staff.

## Proposals

This study has stressed the contribution of telemedicine in two of its main applications: telediagnosis and distance education. Telediagnosis can involve colleagues from the same discipline (expert opinion given at distance) or from different disciplines (teleconsultation). The distance education requested would make possible collective training using medical staff but also individual training through the Internet system, which allows to access the biggest data banks remotely.

In the vast majority of cases, the most appropriate technical solutions are live or delayed image transmission and videoconferences. Their introduction needs to take into account a number of constraints.

### Technical constraints

The delayed transmission of imagery can be performed by the Numeris (ISDN) or Internet systems, providing that there is a high standard of digitalisation of the analogue image. The patient files sent by the requesting doctor can be consulted by his correspondent very quickly, but not necessarily in real time, which facilitates long distance communication.

To be of good quality, videoconferences require a bandwidth that is not yet available over the Internet, but it is

possible with the Numeris system, providing that several lines are used. This network is available in the Territory and with mainland France. However, for the moment there is no direct line (satellite or submarine cable) with Australia. Videoconferences organised with Toulouse, in France, met technical difficulties, in particular in the synchronisation of sound and image. It should also be emphasised that the 9 to 10 hours time difference with Metropolitan France sometimes makes real-time exchanges somewhat difficult.

## Legal and ethical constraints

**Right to secrecy:** Open networks like the Internet are not covered by security arrangements and therefore offer no guaranty as to the integrity of the information transmitted. There is no guarantee that the receiving party is the chosen partner or that the information reaching the receiver is the information originally sent.

**Right to ownership of images:** Open networks do not make it possible to ensure that any data transmitted is not turned to commercial use.

**Right to quality of care:** The quality of images transmitted should be such as to enable a specialist to give an opinion. For this to be the case, the technique used in terms of images, data compression, data transmission and data decompression must comply with the recommendations of various international societies. Transmission should not deteriorate the image.

**Right to reparation:** At the present time, the responsibility lies with the doctor in charge of the patient, but the notion of shared responsibility is making progress.

## Financial constraints

The financial constraints include:

- **Investment.**  
The introduction of such systems is a heavy investment with no certainty that the benefits will be reaped rapidly.
- **Operation**  
Operating costs would depend on the technical solution selected. The least costly options may be preferred initially.

## Organizational and medical constraints

In a well-developed telemedicine structure, a surveillance body exists to define rules for teleconsultations and 'telespecialist' opinions and ensure quality control. This kind of solution would seem too rigid, since the relevant

area of health care use is not yet clearly identified. The CHT doctors have expressed their desire to choose their correspondents freely without necessarily been able to specify their identity for the moment.

It would seem logical to proceed step by step in the implementation of this project, while ensuring that the facilities acquired in the first phase should be able to be integrated into larger structures later.

It is essential to set up a system of territorial and extraterritorial exchanges. What would appear to be the most logical initial step would be to start a delayed image transmission system which would be easy and cheap to implement, apart from the purchase of the analogue-to-digital image conversion equipment, the quality of which must be perfect. Internet transfers are a very flexible solution as regards the choice of correspondents and incur only low operating costs.

The second phase could be videoconferencing, in particular on the territory, making it possible to overcome geographical and human isolation.

## The CHT website

Wishing to communicate before the telemedicine network is set up, the CHT would like to initially develop a Web site for the following purposes:

- to present the CHT and its various departments and medical specialities;
- to make available summaries of various publications by CHT doctors, specific to diseases present on the Territory;
- To propose case management protocols (emergencies, antibiotic treatment);
- To set up links with other partners of the CHT and the Territory (*Institut Pasteur*, SPC, etc);
- To give information to medical students wishing to complete their training on the Territory;
- To propose a forum for medical discussion as the precursor of the future telemedicine network.

By improving the quality of health care and optimising health expenditure, telemedicine is therefore a perfectly appropriate adjunct to the "health promotion and health cost control plan" approved by the Territorial Congress.

The New Caledonia Telemedicine Network is something the majority of doctors met would like to see exist. No funding sources have been identified and no technical solutions adopted. All potential users are requesting that it be implemented as rapidly as possible.

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