

# eHealth strategy and implementation activities in Cyprus

Report in the framework of the eHealth ERA project

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June 2007

## **eHealth ERA**

Towards the Establishment of a  
European e-Health Research Area

FP6-2005-IST-015854

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## About eHealth ERA and this report

This report is the outcome of research in the context of the eHealth ERA project (Towards the Establishment of a European Research Area). The project is implemented by empirica GmbH (coordinating partner, Germany), STAKES (Finland), CITTRU (Poland), ISC III (Spain), CNR (Italy) as well as EPSRC and Imperial College (United Kingdom), based on a Coordination Action contract with the European Commission.

The European Commission, Directorate General Information Society and Media, supports this project to contribute towards greater transparency across Member States and other participating countries on eHealth strategies as well as innovation-oriented research and technology development (RTD) initiatives, including the coordination of Member States' eHealth strategy formulation and implementation. Thereby the project aims at fostering the establishment of an effective European Research and innovation Area (ERA) in eHealth. All project results are available on the internet and can be accessed at the *eHealth ERA* website: [www.ehealth-era.org](http://www.ehealth-era.org).

The status of activities described is generally August 2006.

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## Acknowledgements

This report was prepared by Consiglio Nazionale delle Ricerche, Istituto Tecnologie BioMediche (CNR-ITB) with support from the eHealth ERA team. This report reflects solely the views of its authors, and possible inaccuracies of information are their responsibility.

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2007

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# 1 Healthcare system overview

## 1.1 Basic facts and features of the Cyprus healthcare system

Cyprus has a population of approximately 780.000 people.

The Ministry of Health is responsible for the health care system.

There are two systems of medical services:

1. the Governmental health sector
2. the Private health sector.

THE GOVERNMENTAL HEALTH SECTOR provides medical and health care free of charge to the low-income population. The group formally covered are mainly National Guard soldiers, civil servants and their dependants. Furthermore, medical care is provided free of charge in all cases receiving treatment at the Accident and Emergency Departments irrespective of economic status or nationality of the person involved, including visitors.

The services offered by the Government are primarily secondary and tertiary health services, although there is an extensive network of rural hospitals, rural health centres, sub-centres and dispensaries providing primary care.

Manpower includes physicians, dentists, pharmacists, nurses, health inspectors and health visitors who ensure the provision of adequate services. Currently the services employ 512 physicians and 2.198 nurses.

THE PRIVATE HEALTH SERVICES are dominated by the solo-practicing physician and dentist offering all types of outpatient services. There are also 100 small private clinics some of which are highly specialized, all concentrated in the urban areas. These are supported by all types of the other diagnostic and treatment services such as laboratories, pharmacies, x-ray etc. The private sector has recently established non profit/ voluntary services mostly offering palliative support and rehabilitation in some of the important chronic disorders, such as diabetes, cancer, cardiovascular conditions etc. The private sector offers a more limited scope of services, however recently through amalgamation, private clinics have established some highly specialized facilities for kidney transplantation and open-heart surgery. These are also utilized by the Governmental Sector to serve to eligible patients.

The Ministry of Health formulates national health policies, coordinates the activities of both the private and the public sector, regulates health care standards and promotes the enactment of

relevant legislation. It is organized into various departments and manpower development institutes including (see "Health Care Systems in Transition. Cyprus", 2004):

- (i) General Laboratory, which provides laboratory analysis services, including inspection of food, water, medicine, police evidence and drugs investigations (but not services for clinical purposes);
- (ii) Pharmaceutical Services, responsible for the testing, supply and pricing of pharmaceuticals, inspection of pharmacies, etc;
- (iii) Medical and Public Health Services, responsible for services in the fields of prevention, primary, secondary and tertiary care;
- (iv) Dental Services;
- (v) Mental Health Services.

Cyprus health system is different to that of other western European countries: Specialist treatment and drugs may not be available locally or could require travel to Nicosia. There are no paramedics in ambulances. If a person's income is over 9,000 Cyprus Pound (CYP), then (s)he will have to pay towards the cost of his/her treatment.

The introduction of a National Health Scheme in Cyprus, for which a comprehensive law was passed in 2001, is expected to place more emphasis on primary health care. In the meantime, both the number of rural health centres and sub-centres and the number of doctors in the rural areas has increased significantly<sup>1</sup>. This shows the importance given to public health.

Of the various aspects of the welfare system, the Cyprus health organization has increased attention from the Government and a bigger share of public expenditure for the development of health services.

Besides, the demand for health care in Cyprus is increasing. The number of elderly people is low but growing and creates new service demands. Technological changes, both in terms of equipment and pharmaceuticals, are rapid. Much of this is integrated and disseminated rapidly due to commercial incentives. Some new therapies, for instance new drug treatments after the onset of heart attacks, offer significant health gains at modest cost.

This proves that the standard of health of the Cypriot population compares, nowadays, favorably with that of the population of other countries in Europe.

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<sup>1</sup> <http://www.innovations.harvard.edu/showdoc.html?id=9007>

Besides, Cyprus has been successfully freed of common infections and parasitic diseases and the pattern of illness resembles that of developed industrial nations, with cardiovascular diseases, malignancies and car accidents predominating as the causes of death. It should be pointed out that Cyprus has successfully eliminated malaria in the past and more recently echinococcosis, through the implementation of special campaigns. Current educational and preventive programmes are proving successful in almost eliminating the incidence of thalassaemia, which was a severe health problem.

Indeed, the standard of health of the Cypriot population can be considered quite high. Already life expectancy at birth has reached 80.4 years for women and 75.3 years for men. Infant mortality rates have been successfully contained to 4.9 per thousand of population. The base death rate stands at 6,9 per thousand of population.

Despite this, the reform of the health care sector is a high priority of Government health policy. In fact, the present system of health care has for long been criticized for the fragmentation of its services, the lack of coordination between the public and private health sector, the lack of equity in its financing and in general its inability to respond to the expectations of the population.

What's more, there is the necessity of insuring the public health services also in the rural areas, ensuring accessibility through a network of rural hospitals, rural health centres, sub centres and dispensaries. On 20 April 2001, the House of Representatives enacted a law for the introduction of a National Health System (NHS<sup>2</sup>), which has to provide health care free at the time of delivery. It will be universal in its coverage of population and will be financed by contributions from the state, employers, the self-employed, pensioners and all those who have nonemployment incomes.

The NHS will be administered by the Health Insurance Organization, a public law body managed by a tripartite Board. The Organization will purchase health services from the Government and private medical institutions and services.

Cyprus does not have a national health insurance system (NHIS)<sup>3</sup>. By 1 January 2006, the distribution of European Health Insurance Cards (EHIC) should have been completed, but, according to the current situation described in the EHIC webpage<sup>4</sup>, the distribution process has not

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<sup>2</sup> At the moment, government provision of health care services is funded out of general taxation, with the exception of a small part financed from charges imposed on some services. The financing scheme is expected to change with the implementation of the comprehensive National Health Insurance Scheme (NHIS) in the next five years, when financing of the health care services will be based largely on compulsory health insurance contributions ("Health Care Systems in Transition. Cyprus", 2004)

<sup>3</sup> <http://cyprus.angloinfo.com/information/10/healthcard.asp>

<sup>4</sup> [http://europa.eu.int/comm/employment\\_social/healthcard/situation\\_en.htm](http://europa.eu.int/comm/employment_social/healthcard/situation_en.htm)

been completed yet. However, this does not mean that EHIC is not valid in Cyprus; all Europeans can use their EHIC in Cyprus.

The EHIC of Cyprus neither has a chip, nor a magnetic band. This means that it is not a smart card, because, as it is mentioned before, Cyprus does not have a national health insurance system and it does not use smart cards yet. This EHIC is only an eye-readable identifier for the patients. Application for the EHIC is easy as in all other member states.<sup>5</sup>

## **1.2 National level health goals**

As Cyprus has not introduced an NHIS, the provision of health services is not concentrated on one central authority. Instead there are five types of coverage:

- § the first sub-system is the public sector, which provides services free of charge to low-income groups on the basis of income criteria;
- § the second dominant sub-system is that private health sector health sector, which treats patients on free for services basis, open to all individuals who can afford to pay the going rates. All private sector medical services are operated on the basis of profit making, with the exception of a handful of palliative institution;
- § the third types of coverage is the one offered by employer and trade Union operated medical schemes;
- § the fourth sub-system is the scheme for sponsored patients abroad. Given the small size of the country and inability to organize a full complement of services, including highly specialized tertiary medical services, many patients seek treatment in medical centre abroad. For this, the government provides funding through its sponsored patient scheme. All eligible persons under the income criteria and public sector employees will be automatically covered, but the scheme offers the possibility to cover fully or partially patients who will undergo costly highly specialized treatment abroad;
- § finally there are private health insurance schemes. There is very little information on the extent of coverage by these schemes, but it is generally believed that they are extremely limited. This is because no tax incentives have been offered to persons buying such insurance.

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<sup>5</sup> RIDE "Current European practices in providing interoperability in eHealth domain: Survey of Cyprus Health Care System"

The health care system is confronted with a number of problems including unfavourable conditions for competition which favour the public sector against the private sector in the provision of health services; parallel-uncoordinated public and private sector providers lead to duplication and resultant waste; excess of total supply of hospital and high technology equipment; antiquated organization and management of public hospitals which lead to low levels of productivity; and low fees for use of public hospital services which result in unnecessary use of services and tests.<sup>6</sup>

This situation will change essentially when the NHIS becomes law in the next five years. Under the new regime, the public health system will receive funding from the compulsory health insurance contributions and will also provide comprehensive medical care to the entire resident population at all levels of health care.

The NHIS proposed for Cyprus aims at equity in finance and universal provision of health care with efficient delivery, high standards and containment of cost. Every person will be registered with a private doctor (a general practitioner) of their choice. In each case the doctor will provide any health service deemed necessary. A patient's choice of specialist and hospital is possible but limited by the required treatment. As long as the patient complies with the system parameters there should be no out-of-pocket cost. Health services planned under the NHIS include:

- § primary and specialist outpatient care;
- § diagnostic services, lab tests and other investigations;
- § prescription drugs;
- § hospital care of secondary and tertiary (including acute mental) illnesses;
- § dental care for children up to 15 years of age
- § domiciliary visits and patient transport, physiotherapy and rehabilitation services including provision of prosthetic and orthopaedic appliances.

The cost of the NHIS will be funded from contributions paid out of salaries, self-employment income, pensions and other income. The government will also contribute. It is envisaged that the financing of the NHIS will be tripartite: the government will contribute 50%, employees 25% and employers 25%.

Reform of the health care system will proceed in two steps:

1. Hospitals will be organised into autonomous establishments under the wider public sector. They will have financial independence and will compete with other private sector hospitals for

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<sup>6</sup> "National Lisbon programme of the Republic of Cyprus", 2005.

the provision of healthcare. As such, these units like other private hospitals will be required to apply cost minimisation principles and will therefore strive to provide the best possible care at a cost which reflects costs and market prices.

2. In the second phase, planned for 2008, the NHIS will be launched. This will establish universal, healthcare coverage within the public healthcare system. It will also bring to the forefront the role of the general practitioner doctor so as to control more effectively referrals to specialists both domestically and overseas. These changes will improve considerably the efficiency of the hospital system and although the start-up costs will be significant, it is estimated that the medium- to long-term benefits will be large both for the provision of healthcare itself, and the long-run economic repercussions.

The Ministry of Health imagines that over the next 3-7 years, it will be able to introduce information technology into services and departments in order to<sup>7</sup>:

- § provide better service through increased productivity and timely management of information,
- § move towards paperless & filmless hospitals through the introduction of Electronic Health Record systems,
- § introduce a smart medical card,
- § provide remote medical services (internet, telemedicine and robotics),
- § provide access to external and internal data banks.

In order to achieve these goals, the ministry defined the roles and responsibilities of the ministry IT section. In brief, these are <sup>8</sup>:

- § submitting suggestions to the ministry on policy issues relevant to IT,
- § managing the implementation of the information systems strategy,
- § performing all the system administration functions,
- § providing support for the existing projects.

The Department of Medical and Public Health Services continued in 2005, as well as previously, to offer its services in the following areas<sup>9</sup>:

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<sup>7</sup> [http://www.moh.gov.cy/moh/moh.nsf/computer\\_en/computer\\_en?OpenDocument](http://www.moh.gov.cy/moh/moh.nsf/computer_en/computer_en?OpenDocument)

<sup>8</sup> RIDE "Current European practices in providing interoperability in eHealth domain: Survey of Cyprus Health Care System"

- § Prevention,
- § Primary, Secondary and Tertiary care
- § Public Health
- § Other Services i.e. Physiotherapy, Speech Therapy, Rehabilitation Services, Neurophysiology Lab., Laboratory work, X-ray dept etc.
- § Health Promotion
- § Education and Continuing education of the Staff
- § Epidemiological Research Projects

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<sup>9</sup> [http://www.moh.gov.cy/moh/moh.nsf/computer\\_en/computer\\_en?OpenDocument](http://www.moh.gov.cy/moh/moh.nsf/computer_en/computer_en?OpenDocument)

## 2 Strategic eHealth Plans and policy measures

### eHealth strategies

The strategy of the Cyprus government for eHealth aims to provide better healthcare at lower cost. The centre of attention has also been shifted to the patient and their needs. The strategy aims at building up a unified national health information system.

eHealth in Cyprus covers a wide range of applications. For example, such application include hospital information systems, a national health monitoring system, computerisation of primary care services, computerisation of the forthcoming Health Insurance Scheme, introduction of a patient card, electronic health record, standardisation of medical terminology, classification and coding of diagnoses, medical produces, causes of death and access to external and internal banks.

The implementation of the strategy is expected to the increase the quality of health services, increase the effectiveness and efficiency of procedures and support decision making and health policy formulation, provide remote medical services (internet, telemedicine and robotics), and move steadily towards paperless and filmless hospital through the introduction of Electronic Health Record system and the medical smart card.

### eHealth Action Plan for the Ministry of Health

The MOH, in its strategic study (the strategic study has not been adopted yet by the Council of Ministers), has defined the basic components for a health information application software and has included a major section for an eHealth roadmap.

The main effort is to implement, in a pilot phase, this information system where all the operation of health application and services can be based on.

The solution is expected to satisfy the following long-term objectives of Ministry of Health:

- § Introduce an integrated health care information system that will cover all the function of the modern hospital.
- § The envisioned system will have the capability for a full electronic patient record, will be web-enabled and will support the vision of the Ministry of Health for paperless and filmless hospital (in the long time).
- § Formulate an integrated Health Information System that provides management with the appropriate information and control.
- § Support Health Monitoring Requirements

- § Introduce into the New Nicosia General Hospital (pilot phase) a workgroup environment where people can work sharing information and resources and also the appropriate software that apply to specific tasks or application; this anticipation in the New Nicosia General Hospital and Farmagusta General Hospital will be expanded to cover all the hospitals and medical centres under the public sector.
- § Provide access to external/internal information and databases (extranets/intranets) to the people who need it.
- § Be designed to address the needs of the forthcoming General Health Scheme that will be characterised by a robust primary care sector.
- § Take into account that private doctors and clinical will be given access, where appropriate, to the hospital medical record of the a patient.

The process is at its initial stage and it will begin gradually from the computerization of the New Nicosia General Hospital and Farmagusta General Hospital.

### **Implementation**

It is envisioned that part of the system will be operational in the two major Hospital within a year from the project initial time, which is estimated early next year. The implementation process will take into account the needs of the management of the Hospitals. The Ministry is planning the roll out of the rest of the public sector hospitals after three years provided successful pilot implementation.

A Project like developing an Integrate Health information System will depend on a wide range of local and external factors. The introduction of a New Health Scheme will integrate all actors, private, public and the insurance companies.

A contribution to support work and efforts is expected at European level in the area of interoperability, standards, security, and legal issues to enable the wider application of health telematics in all areas of medicine. An Europe-wide cooperation could accelerate the pace in medical information and heathcare for the whole of heath care sector in Cyprus, thus enabling the offering of a better service to the citizen.

### **Vision of the Ministry of Health regarding Information Technology**

The **Mission** of the Ministry of Health is the continuous improvement of the health of the population of Cyprus, through the prevention of disease, and the provision to every citizen of high level health care, respecting the rights of every patient to high quality medical care delivered with dignity. The main features of this strategy are <sup>10</sup>:

- § The emphasis on the prevalence and incidence of diseases and mortality data
- § The provision of equal opportunities for health care to all citizens, irrespective of their socio-economic status and place of residence.
- § The promotion to the greatest possible degree of co-operation between the public health services and the private health sector.
- § The improvement of effectiveness and efficiency of the public health services.

### **Role and responsibilities of the Ministry IT Section**

The following are considered the major roles of the IT Sections <sup>11</sup>:

- § Submit suggestions to their Ministry / Department and DITS on Policy issues relevant to Information Technology in the Ministry / Department.
- § Manage the implementation of the Ministerial / Departmental Information Systems Strategy.
- § Undertake / manage the Study, Development and Implementation of non-strategic projects within their Ministry / Department within the standards and guidelines set out by DITS, including preparation and maintenance of the relevant project plans.
- § Assist with the Study, Development and Implementation of strategic projects within their Ministry / Department
- § Perform all the System Administration functions, namely:
  - Ensuring that the Ministerial / Departmental systems are operational.
  - System tuning.
  - Identification of malfunctions and liaising with the Suppliers for their correction.
  - Provision of user support.

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<sup>10</sup> [http://www.moh.gov.cy/moh/moh.nsf/mission\\_en/mission\\_en?OpenDocument](http://www.moh.gov.cy/moh/moh.nsf/mission_en/mission_en?OpenDocument)

<sup>11</sup> [http://www.moh.gov.cy/MOH/moh.nsf/legislation\\_en/legislation\\_en?OpenDocument](http://www.moh.gov.cy/MOH/moh.nsf/legislation_en/legislation_en?OpenDocument)

- Maintaining the original versions of software and the relevant documentation.
  - Maintain configuration records detailing the hardware and software used in the Ministry / Department, including serial numbers and/or version numbers, where applicable, and their location.
- § Installing new / updated versions of hardware and software.
- § Assigning authorisations for network resources.
- § Ensuring that satisfactory back-up procedures are in place.
- § Participate on the Project Boards of the projects of their Ministry / Department.
- § Provide consulting services to their Ministry / Department.
- § Provide 2nd line support for the projects of their Ministry / Department. (1st line support will be provided by the Expert Users)
- § Provide 1st line technical support.
- § Conduct Technical Quality Assurance Reviews.
- § Participate in Technical Committees Organising and/or conducting appropriate IT related training for users

### **Vision of Department of Electronic Communication (Ministry Communication and Works)**

The Department of Electronic Communications is the responsible authority for the implementation of the Directive 1999/5/EC as far as radio-equipment is concerned and the Office of the Commissionaire for Electronic Communications and Postal Regulation for the telecommunication terminal equipment.

The essential requirements for all apparatus are as follows <sup>12</sup>:

- § the protection of the health and safety of the user and any other person, including the objectives with respect to the safety requirements contained in Directive 73/23/EEC (the Low Voltage Directive) but with no voltage limit applying
- § the protection requirements with respect to electromagnetic compatibility contained in Directive 89/336/EEC (the EMC Directive)

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<sup>12</sup> [http://www.mcw.gov.cy/mcw/dec/dec.nsf/DMLindex\\_en/DMLindex\\_en?opendocument](http://www.mcw.gov.cy/mcw/dec/dec.nsf/DMLindex_en/DMLindex_en?opendocument)

Manufacturers of mobile phones, other portable wireless devices and base stations should take into account the latest thinking on public health, including Recommendation 1999/519/EC of the Council and European Parliament. In addition to the above, radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/satellite radio communication and orbital resources, so as to avoid harmful interference. This aspect covers such parameters as effective radiated power of the fundamental, frequency error, emission bandwidth, adjacent channel power, frequency stability and spurious emissions.

### **Vision of Ministry of Finance**

Policy Priority: Improvement of the Quality of Life – eHealth (october 2006) <sup>13</sup>.

Introduction of an Integrated Health Care Information System (IHCIS):

The introduction of the Integrated Health Care Information System in the new general hospitals of Nicosia and Famagusta has not started yet, because of the legal proceedings taken against the decision for the award of the tender for the system's application. The case will be examined by court in early autumn 2006, and if the outcome is in favour of the decision taken, the implementation of the system will start in October 2006 and be fully operational by the end of 2007.

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<sup>13</sup> "NATIONAL REFORM PROGRAMME OF CYPRUS PROGRESS REPORT", 2006

[http://www.mof.gov.cy/mof/MOF.nsf/All/A71849877D2AB341C22571A9007410C6/\\$file/Progress%20Report%20of%20National%20Reform%20Programme,%20Main%20Part,%20October%202006.pdf](http://www.mof.gov.cy/mof/MOF.nsf/All/A71849877D2AB341C22571A9007410C6/$file/Progress%20Report%20of%20National%20Reform%20Programme,%20Main%20Part,%20October%202006.pdf)

## 3 eHealth deployment status

### 3.1 Legal and regulatory framework

Public Tenders Law N. 102(I)/97, its amendments, and the Public Tender (General) Regulations K.P.D. 104/99 with their amendments govern the purchase of goods for the public sector.

This framework maintains that the procedure for purchasing goods for the public sector depends on their value. For high technology medical equipment, the following procedure applies<sup>14</sup>:

1. Department of Medical and Public Health Services appoints a project team to prepare specifications for the equipment required and define any other tender conditions according to the legislative framework.
2. Potential providers commonly submit their proposals in two separate and sealed envelopes containing the technical proposal and financial proposal respectively. Usually a full maintenance contract is purchased with the equipment, ranging from five to seven years post warranty.
3. Draft specifications prepared by the project team are announced in the Official Journal of the Cyprus Government and made available to all prospective providers for comments. A period of four to six weeks is usually allowed for providers to comment and suggest improvements to the tender specifications.
4. A project team evaluates comments and suggestions submitted and prepares a detailed report, with additional comments and suggestions, which is submitted to the Permanent Technical Committee of the Main Tender Board for approval.
5. The project team is invited to support its report during a hearing at which the Technical Committee scrutinizes the report and makes its own recommendations to ensure the application of fair competition principles between the prospective providers. Usually a minimum of four providers should be able to compete.

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<sup>14</sup> "Health Care Systems in Transition. Cyprus", 2004

6. Final tender is published in the Official Journal of the Cyprus Government, allowing at least 52 days for providers to draft and submit proposals. The Main Tender Board opens and evaluates the technical proposals to assess whether the general tender requirements have been met. The financial proposals remain sealed in a safe. Having met the condition of compliance with general requirements, technical proposals are sent to the Department of Medical and Public Health Services for evaluation.
7. There, a tender evaluation team is appointed, usually project team members and end users. The team evaluates the technical proposal and prepares a technical evaluation report for submission to the Main Tender Board.

### **3.2 Education and training on ICT**

In the way of participation in the E.U., Cyprus has been promoting a system of e-government.

Seven departments of the Ministry of the Interior, which offer services to citizens, have drawn up a Citizen's Charter with a view to providing fuller information and quicker services to the public.

This important innovation marks the start of a new era in the relations between the Ministry of the Interior and the citizens, a relation based on mutual respect, understanding and cooperation and mainly on the provision of substantive, immediate and impartial services to the public.

The departments that have prepared and implemented the Citizen's Charter are: Land and Survey Department, Town Planning and Housing Department, Migration Department, Registration Department, Special Service for the Care and Rehabilitation for the Displaced and Management of Turkish Cypriot Properties.

The Citizen's Charter is a bond of honour between the public service and citizens and safeguards the right of citizens to enjoy quality and high-standard services. At the same time, it helps make public servants feel satisfaction for the services they provide to the public.

The Citizen's Charter is not a document which contains only theoretical and general principles and aims. On the contrary, it contains specific provisions and sets out specific obligations for the public services, the period of time within which the department has the obligation to reply, the type of information to be given etc.

On the basis of the Citizen's Charter, public services are obliged to inform the public in detail on the kind of services they provide; to define and publicize standards of services; to be easily accessible and friendly to the citizen and to provide adequate information; to explain the options

afforded and give correct advice to the public; to be courteous and forthcoming in providing services and to rectify mistakes.

The Ministry of the Interior has undertaken the following obligations:

1. All letters should be replied to promptly and clearly. Every department should set its aims/standards of service and publicize at specific intervals the progress achieved.
2. Appointments between government officers and citizens should be held without any delay. (Delays should not exceed ten minutes.)
3. To give specific and clear information on the services the department is providing and at least one telephone number to ring for information.
4. Government officers should regularly ask the opinion of the public about the level of the services provided and the results achieved.
5. To define procedures and to adopt appropriate measures, which ensure easy and unimpeded access to the services, provided to all citizens<sup>19</sup> e-Health, better health and healthcare through the use of information and communications technologies.

### ***3.3 eHealth applications and services***

Cyprus is at a very initial stage of using ICT applications in the health sector.

With the ehealth system patients will benefit from the use of information and communication technologies in healthcare. Patients need to contact their family doctors, doctors need to talk to hospitals, and hospitals need to interact with clinics and research centres, all with the aim of providing better care for patients and effective solutions for health care systems<sup>15</sup>

There is no integrated health system, very low usage of PCs in health centres, whilst the IT infrastructure of the Ministry of Health (MOH) is inadequate for the utilisation of the huge amount of information and data. This leads to inefficient administration of resources available, increased bureaucracy and restricted potential in the provision of quality health services.

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<sup>15</sup> RIDE "Current European practices in providing interoperability in eHealth domain: Survey of Cyprus Health Care System"

In its efforts to introduce e-Health in Cyprus, the Ministry of Health has initiated the deployment of promising pilot projects in collaboration with the University of Cyprus, through which two successful e-Health projects have been completed <sup>16</sup>:

1. **DITIS (Network of Medicine Tele-cooperation for Home Care)** is a healthcare system that enables the effective management and co-ordination of healthcare teams for the continuous assessment, diagnosis and treatment of patients. Through DITIS healthcare providers can have access to electronic patient information from anywhere and anytime via computer or mobile devices.
2. **Portable medical device for emergency telemedicine.** The system enables the transmission of critical bio-signals such as the electrocardiogram, blood pressure, heart rate, temperature and still images of the patient, from the emergency site to the hospital.

### **Health Care Information System (HCIS).**

The Ministry of Health has decided to proceed with the implementation of Health Care Information Support (HCIS) System in all government hospital, outpatient department and rural health centres.

In 2004 the Ministry and Department of Information Technology Services (DITS), jointly issues a Request for Proposal (REP) for a turnkey ready-made application software which would provide an Integrate Health Care Information System. The vendor selection procedure was completed two years later, in 2006. The following integrated applications and modules will be provided to support the activities of the hospital <sup>17 18</sup>:

- § patient administration/Electronic Health Record,
- § coding of disease, operations, procedures,
- § hospital order entry and management system
- § clinical laboratory/histopathology
- § blood bank
- § radiology/Picture archiving and communication system (PACS)
- § doctor's pharmacy prescription

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<sup>16</sup> National Lisbon programme of the Republic of Cyprus, 2005

<sup>17</sup> [http://www.moh.gov.cy/moh/moh.nsf/computer\\_en/computer\\_en?open](http://www.moh.gov.cy/moh/moh.nsf/computer_en/computer_en?open) Document/

<sup>18</sup> National Lisbon programme of the Republic of Cyprus, 2005

- § billing
- § personnel management
- § stores/inventory control
- § Heath Smart Card

The implementation of a PACS system has already begun at the New Nicosia General Hospital.

A further invitation to tender for consulting services, equipment and software development for a national health monitoring system was launched in August 2005. The project is developing an expandable, flexible comprehensive data warehouse to produce the required range of health indicators. The Health Monitoring Project is scheduled to be completed by the end of September 2007.

The HCIS tender contractual processes are at their final stage and implementation is scheduled to begin with the computerisation of two flagship hospitals: the New Nicosia General Hospital and the Famagusta General Hospital.

The Ministry of Health then intends to roll-out the IHCIS to all hospitals and medical centres under the public sector by 2010. Private doctors and clinics, where appropriate, will be given access to the hospital patient record. The recently constructed high-tech new Nicosia General Hospital will be the central node of the health institutions of Cyprus.

### **Plan and organization for Telemedicine implementation**

In 1989 the computerization of the Health Information Support System (HISS) started as co-project with the Ministry of Health and East Mediterranean Region Office (EMRO) of the World Health Organisation (WHO). The Patient Administration System (PAS) modules were implanted in Archbishop Makarios III hospital in Lefkosia and completed in 1993.

Subsequently, the Ministry of Health, in collaboration with further implementation at the Lemesos, Larnaka and Pafos General Hospitals. This phase was completed in March 1995, December 1998 and March 1999 respectively. The system is currently being implemented at the three rural hospitals Keperounda, Paralimni, and Polis.

The Ministry of Health has decided to continue with the further implementation of PAS modules at all Government hospitals, outpatient departments and rural health centres. The health information system will be expanded to cover all disciplines, including pharmacy, pathology, radiology,

laboratories, theatre management, blood bank, clinical management support, order management, manpower, estate, availability and use of facilities, etc.<sup>19</sup>

### **3.4 Selected abstracts on eHealth projects**

Here are a few abstracts about strategically relevant eHealth projects in Cyprus<sup>20</sup>.

#### **Selected eHealth application in Cyprus from the training perspective**

Authors: Jossif A, Pattichis CS, Kyriakides M, Pitsillides A, Kyriacou E, Dikaiakos M.

Department of Pediatrics, Makarios Hospital, Nicosia, Cyprus. [ajossif@cytanet.com.cy](mailto:ajossif@cytanet.com.cy)

**OBJECTIVES:** In this paper a review of selected eHealth applications in Cyprus is presented linked with their success or failure based on their training activities.

**METHODS:** The eHealth systems presented and their training activities include an update of the health information system (HIS) in the public hospitals, a medical system for emergency telemedicine (AMBULANCE and EMERGENCY-112 projects), a home monitoring system for cancer patients (DITIS), a satellite-based network in healthcare applications (EMISPHER and HEALTHWARE projects), and the training activities of the Cyprus Society of Medical Informatics. Different methodologies for training were used ranging from classical approaches like train the trainers, using demo cases followed by personal training, group training, and workshops, to more recent methodologies based on eLearning sessions including teleconsultations.

**RESULTS:** The training was carried out successfully in all cases. However, not all eHealth systems were put into practice successfully, mainly for reasons not related to training.

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<sup>19</sup> World Health Organisation (WHO) <http://www.who.int>

Bank of Cyprus Oncology Centre: <http://www.bankofcyprus.com/about/oncology.html>.

Ministry of Health and East Mediterranean Region Office (EMRO)

<http://www.who.int/regions/emro/index.html>

<sup>20</sup> [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list\\_uids=17224988&query\\_hl=3&itool=pubmed\\_docsum](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list_uids=17224988&query_hl=3&itool=pubmed_docsum)

**CONCLUSIONS:** It is anticipated that this paper will promote the importance of these applications and their training activities as well as help in the spin off of others thus enabling the offering of a better service to the citizen.

### **Healthcare telematic applications in Cyprus**

Authors: Pattichis CS, Schizas CN, Andreou AS.

Department of Computer Science, University of Cyprus, Cyprus. [pattichi@ucy.ac.cy](mailto:pattichi@ucy.ac.cy)

**OBJECTIVES:** a) To present a review of ongoing health telematic applications in Cyprus. b) To promote the use of these health telematic applications in the Cyprus region. c) To help in the spin off of other health telematic applications thus enabling the offering of a better health service to the citizens.

**METHODS AND RESULTS:** The health telematics applications include a medical system for emergency telemedicine (AMBULANCE and EMERGENCY-112 projects), a system for the evaluation of the risk of stroke by telemedicine (EROS), a diagnostic telepathology network in gynaecological cancer (TELEGYN), a collaborative virtual medical team for home healthcare of cancer patients (DITIS), and a health telematics training network (HEALTHNET). The paper refers to the set-up and characteristics of these applications and tries to relate them with the health policies that should be applied in Cyprus.

**CONCLUSIONS:** It is anticipated that this paper will promote the importance of health telematics applications for Cyprus and increase the awareness on the possibilities that these applications offer for health policies in all levels of health related human resources.

### **User perspective of DITIS: virtual collaborative teams for home-healthcare**

Authors: Pitsillides B, Pitsillides A, Samaras G, Andreou P, Georgiadis D, Christodoulou E, Panteli N.

Cyprus Association of Cancer Patients and Friends.

DITIS supports home-care by offering wireless health care services for chronic illnesses. The main service is the dynamic creation, management and co-ordination of virtual collaborative healthcare teams for the continuous treatment of the patient at home, independently of the physical location of

the team's members (or the patient). For each patient a flexible (dynamic) virtual medical team is provided, made up from visiting home-care nurses, doctors, and other health care professionals, responsible for each case. This virtual team is able to provide dedicated, personalized and private service to the home residing patient on a need based and timely fashion, under the direction of the treating specialist, without the necessity to move the patient from his home, thus making better use of the scarce and expensive medical professionals and scarce hospital beds, irrespective of geographic or organisational barriers.

DITIS uses a number of state of the art technologies which are seamlessly put together, such as collaboration and personalization via mobile agents, access to medical data from anywhere and any time via a variety of mobile devices and a variety of protocols (i.e., WAP, HTML) and continuous connectivity via new communication technologies such as ADSL and GPRS, and soon UMTS. All the technologies are selected for platform independence.