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National PACS Programme in Estonia - Results and Successes

Authors

Andrus Aavik

Head of Biomedical Department

Tartu University Hospital

Tartu, Estonia

Andrus.Aavik@kliinikum.ee

Tõnis Allik

Head of Management Board

North Estonia Medical Centre

Tallinn, Estonia

Tonis.Allik@regionaalhaigla.ee

Sergei Nazarenko

Head of Diagnostic Division North Estonia Medical Centre

Tallinn, Estonia

Sergei.Nazarenko@regionaalhaigla.ee

Andrus Paats

Senior Engineer

North Estonia Medical Centre

Tallinn, Estonia

Andrus.Paats@regionaalhaigla.ee

On June 12th 2006, an Estonian PACS programme (Eesti Tervishoiu Pildipank) was co-founded by Tartu University Hospital and the North Estonia Medical Centre. In this article, we will give an overview of the recent history of this process, key factors that facilitated this development, as well as the future of PACS in Estonia.

The national Estonian PACS dates back to the Baltic International Telemedicine NETwork (BitNet) project, launched in 1999 at the initiative of the University of Uppsala, Sweden. As part of this project, ISDN-based links were established between the Uppsala University Hospital and four hospitals in Estonia: Tartu University Hospital, the North Estonia Medical Centre, the Ida-Viru Central Hospital and the Haapsalu Rehabilitation Hospital.

Initially, up to four dial-up connections were simultaneously used for audio-video conferencing, covering the conferencing process, physical examination of the patient, demonstration of medical records and films on light boxes. In the late Nineties, the number of devices with digital image output increased in Estonia and digital archiving on offline media began. The first CR system was installed at the North Estonia Medical Centre in 1997, but printouts were still predominantly in use for reporting and long-term archiving. In 1998, the East Tallinn Central Hospital started to archive ultrasound images offline on MODs, marking a trend for digital archiving of non-3D studies.

In 2001 a mini-PACS was instituted at Tartu University Hospital, where two CT, one MR and one CR system were connected to a DICOM server, enabling web-based distribution of images using DICOM workstations. The introduction of devices with digital image output, offline digital archiving and implementation of the first mini-PACS in Estonia was a result of local hospital level initiatives rather than any governmental decisions.

Role of the National Society in Estonia

One of the key forces behind these initiatives was the Estonian Society of Radiology, a non-profit and nongovernmental organisation aimed at the improvement in quality of radiological services. During the Nineties, at least one educational event was organised monthly to promote new radiology technologies and practices. In 1998, the Radiology Development Board of the Society stated the need for the establishment of a central archive for radiological images. In 2000, the Development Plan for Estonian Radiology for the period of 2000 - 2015 was issued, stating the need for the establishment of a country-wide PACS. This goal was achieved in 2006.

Cooperation Key to National

PACFor the establishment of nationwide PACS, a critical number of collaborating healthcare providers had to be reached. A de facto cooperation between Tartu University Hospital and other Estonian hospitals in 2002 aimed at archiving and accessing all imaging studies at one central PACS. For four-and-a-half years the PACS service was free of charge, easing the initial introduction of the system to customers. A significant number of customers stayed loyal after the fee for archiving (approx. 1 EUR per study) was applied. Radiologists worked to familiarise clinical partners with a digital imaging environment, teaching them how to use PACS in their daily work.

Taking Steps Towards Digitisation

There were two extremely important factors facilitating the process of the establishment of nationwide PACS in Estonia. Firstly, during the Nineties in Estonia a good infrastructure for telecommunication was created, enabling 1 Gbit network for almost all healthcare providers. Secondly, in the framework of the hospital reform of 2001 – 2002, formerly independent hospitals were merged. This created the necessity of networking with the aim at communication and resource-sharing. At this point the aspirations of local radiology managers met with the needs of managers at the level of hospital and national governance. Another factor was that digital archiving became gradually cheaper and is now the most feasible storage option.

In 2003, another local mini-PACS was installed at East Tallinn Central Hospital, where one CT, one angiograph, one ultrasound system and three CR systems were connected to a DICOM server, enabling web distribution of images and using DICOM workstations.

In 2003 and 2004, the North Estonia Medical Centre proposed to all healthcare institutions in the neighbourhood of Tallinn to establish a joint PACS by cosharing the costs proportionally to the volume of archived data. Unfortunately this attempt was not successful mainly due to the lack of cooperation between the institutions. Among the underlying reasons were the lack of investment power of some counterparts, and the fear of some partners of being under supervision of the quality and the case mix of their clinical work. Consecutively, the North Estonia Regional Hospital initiated two processes – it started procurement for its own PACS devices and joined the Tartu University PACS. This merger assured the vast majority of diagnostic images produced in Estonia to be managed in one single PACS.

Tartu University Hospital and the North Estonia Medical Centre are the two major hospitals in Estonia, sharing about the half of the budget allocated for specialised healthcare services, including for imaging, in Estonia. Estonian PACS consists of two mirrored archives physically located 180km from each other in Tartu and Tallinn. It has the total capacity of 18 TB. It receives images from more than 80 imaging units from 21 healthcare institutions (78% of the current imaging capacity of the country). The amount of daily archived data is on average 125 GB.

It offers the opportunity to view images at 24 healthcare institutions. Healthcare providers that do not submit images to this PACS and practically all general practitioners also have access to Estonian PACS via the secure web interface. General practitioners may access images and reports at their workplace, which has created a prerequisite for Estonia to become a filmless country. Today, many GP practices have become paperless and strongly support filmless solutions provided by PACS. At the present, the countrywide Radiology Information System (RIS) is being developed. It will become an integrated and inseparable part of the Estonian PACS. Estonia has very strict data protection legislation. Therefore Estonian PACS is under strong self monitoring and under the supervision of the National Data Protection Agency.

From a legal standpoint, the Estonian PACS is a nonprofit foundation. There is a Council over our national PACS, consisting of the members nominated by the two co-founding hospitals and the invited members from Ministry of Social Affairs and the Estonian eHealth Foundation.

Lessons Learned

Finally, one could ask whether the relatively small size of Estonia was an important factor supporting the fast establishment of a nationwide PACS. The answer could be easily “yes”. However, one has to recognise that all the organisational and technical requirements are identical for European countries regardless of their size. In smaller populations, the costs per capita may be even higher than in larger populations. Our experience shows also that in a small country there are specific factors that may totally undermine the establishment of a nationwide medical information system, including fear of social transparency regarding loss of data protection or establishment of supervision of quality and case mix by competing healthcare providers.

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