Tele-echocardiography in pediatric cardiology: the experience in Tuscany region

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Abstract. Regional teleconsulting network for heart malformations has been developed in Tuscany by Gabriele Monasterio Tuscany Foundation (FTGM) (www.monasterio.it), established by the National Research Council and the Tuscany Region and specialized in research and treatment of cardiovascular and pulmonary diseases. Lions Clubs International supported since 2015 the implementation of this network ("Arriviamo al Cuore di Tutti"), which is providing 24h service to 14 neonatology/pediatric centers throughout the region from two HUB centers (Heart Hospital of FTGM in Massa and Meyer Pediatric University Hospital in Firenze). Both live and store-and-forward tele-echocardiography were implemented, while a medical record web app was developed for collaborative reporting.

Methods. While echography allows recognizing complex cardiac malformations, often in community hospitals the operator is not enough skilled. By tele-echocardiography the physician, who is examining the patient ("the operator"), is able to transmit echo-images to a reference center, where an expert cardiologist ("the consultant") can provide further analysis and interpretation. This approach was applied in pediatric cardiology over many years to increase efficiency and quality of care, promptly and without geographical limits, enabling accurate decision making on triage, transport, and therapeutic or interventional plans, preventing unnecessary transport of babies, yielding financial savings and raising patient and physician satisfaction. In our project, each health-care center (SPOKE) was securely connected to reference pediatric cardiology center (HUB). Video communication technology was applied on mobile medical-grade carts, which are able to transmit, friendly and effectively, the ultrasound images during videoconference session, achieving "live" tele-echocardiography. Store-and-forward facility is also provided to allow transmission of full resolution DICOM images for revision of live evaluations and in case of communication drawbacks.

This solution was first applied, with the support of "Un Cuore un Mondo" Association in the International Health-Care Cooperation program of Tuscany Region, from Balkan countries to FTGM Heart Hospital and later in Tuscany, where FTGM and MEYER pediatric cardiology departments jointly serve as HUB consultant centers.

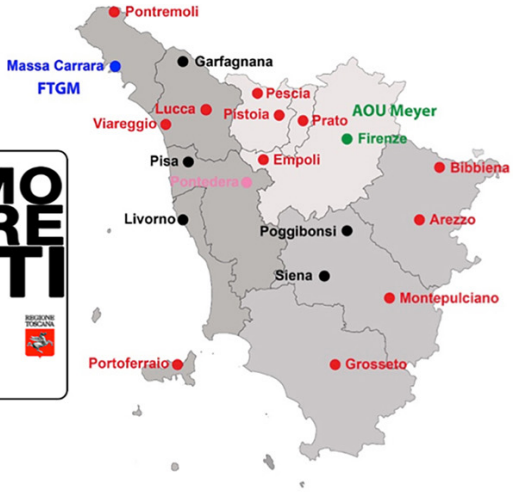
FTGM ITC researchers developed a medical record system (web securely accessible) for documentation and reporting. The operator at SPOKE is enabled to document patient medical history and clinical conditions, to record echocardiography findings, to manage disclosure and informed consent and to report diagnostic conclusions in agreement with the consultant cardiologist from the HUB center.

Results. FTGM, financially supported by the Lions Clubs and promoted by Regional Authorities, contacted the main health-care institutions throughout Tuscany for implementation of tele-echocardiography service. Formal agreements were set up for experimentation defining legal issues for care delivery cooperation in pediatric cardiology. FTGM ITC staff, in cooperation with the regional technical health-care organization, set up network connections and installed the telemedicine workstations at both the two HUBs (FTGM Heart Hospital and Meyer Hospital) and at 14 SPOKE centers in Tuscany. Other centers were also set up in Sardinia and Albania (Scutari). More than 500 patients were so far examined and followed up by tele-echocardiography.

Conclusions. Tele-echocardiography allows collaborative medical decision-making in diagnosis and care of complex and critical heart defects. It plays an important role in the early diagnosis, follow-up, or exclusion of cardiovascular abnormalities, planning patient mobility to tertiary specialist center when really necessary. That was particularly important during the COVID-19 pandemia.
Extension of use of tele-echocardiography in fetal diagnosis of cardiac malformations would allow early diagnosis for planning care and interventions. Moreover, the telemedicine network can be extended to other medical pathologies, also in adults just providing remote specialized medical care around the region.

HUB

- FTGM Ospedale del Cuore - Massa
- AOU MEYER - Firenze



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