

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

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Abstract. Regional teleconsulting network for heart malformations was developed in Tuscany by Gabriele Monasterio Tuscany Foundation (FTGM) (www.monasterio.it), established by National Research Council and Tuscany Region and specialized in research and treatment of cardiovascular and pulmonary diseases. Lions Clubs International supported since 2015 the development of this network (“Arriviamo al Cuore di Tutti”), which is providing 24h service to 14 neonatology/pediatric centers throughout the region from two HUB centres (FTGM Heart Hospital in Massa and Meyer Paediatric University Hospital in Firenze). Both live and store-and-forward tele-echocardiography were implemented, while 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, yielding financial savings and raising patient and physician satisfaction. Each health-care center (SPOKE) was securely connected to reference pediatric cardiology center (HUB). Videoconference technology was applied on mobile medical-grade carts, which are equipped to transmit, friendly and effectively, ultrasound images, achieving live tele-echocardiography. Store-and-forward facility is also provided to allow transmission of DICOM images for revision and in case of communication drawbacks.

This solution, which 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, has been implemented in Tuscany, where FTGM and MEYER pediatric cardiology departments jointly serve as HUB centers.

FTGM ITC researchers developed a medical record system (in compliance with standard regulations) for documentation and reporting. At SPOKE the operator 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, supported by the Lions Clubs and promoted by Regional Authorities, cooperated with health-care institutions throughout Tuscany for implementing tele-echocardiography services. Formal agreements were set up for care delivery cooperation in pediatric cardiology. FTGM ITC staff, in cooperation with regional technical health-care organization, set up network connections and installed telemedicine workstations at both the HUBs (FTGM Heart Hospital and Meyer Hospital) and at 14 SPOKE centers. Other centers were experimented 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 necessary. That was particularly important during the COVID-19 pandemic.