

Clinical Ultrasound: how innovative technologies can allow us to use tele-medicine

Our team's commitment to Primary Healthcare Worldwide aims at increasing accessibility to quality healthcare for all. An underlying goal becomes that of enabling sustainable and cost-effective access to timely health diagnosis, especially where it is most lacking and for the most vulnerable, isolated and underprivileged.

We asked ourselves: how were we to do this? And in what way could our approach enable a sustainable and responsible kind of development and not be just a momentary aid?

Innovative technologies gave our team a first answer as to how to contribute and accomplish this mission. Dr. Dulchavsky's research with NASA proved Clinical Ultrasound to be an ideal diagnostic imaging tool to use in remote and resource scarce contexts, as is space and the space shuttle, and as are many underprivileged areas worldwide. Their work also built upon the use of innovative technologies to provide effective just-in-time education. They began using video and 3-D images to quickly educate astronauts, thus non-medical personnel, to be capable of capturing diagnostic images through the ultrasound and perform first basic diagnosis. In addition, innovative technologies allowed them to use tele-medicine to support, guide and perform the astronauts' clinical diagnosis. Indeed, through appropriate technologies the ultrasound images taken in space were placed on a protected Internet website and viewed by doctors on Earth.

Similarly, Dr. Luca Neri and WINFOCUS began to affirm and develop the use of ultrasound in other time and resource-limited conditions, especially in emergency medicine worldwide.

Together, WINFOCUS and Dr. Dulchavsky joined efforts and began building upon the use of ultrasound and tele-sonography. They confirmed clinical ultrasound to be a unique management and immediate diagnostic triage tool that offers rapid and replicable imaging at affordable costs and with greater portability, robustness and adaptability to context and user, as well as allowing for effective tele-medicine. While the use began to spread within the medical field, there was potential for important applications in the developing world and underserved areas. However, technology alone and specifically, clinical ultrasound alone, cannot make a sustainable difference nor enable a long lasting and exponentially replicable model for expanding access to healthcare worldwide. A development framework and appropriate strategies are needed. Thus, my background in development economics and ongoing research for the Human Development and Capability Approach Association, came into play. I joined Dr. Dulchavsky's team at Henry Ford Hospital and his partnership with WINFOCUS to develop and implement development policies, which would allow maximizing the impact of the innovative technologies. The team's method has become that of applying the Human Development Approach to develop *globally* applicable and yet *locally* tailored sustainable healthcare development projects.

In particular, the HFH and WINFOCUS group unite five components and build upon the exclusive characteristics of each: innovative technologies -clinical ultrasound and e-services in particular, clinical management, education through innovative pedagogies, development strategies, and networking and alliances. Also, each component is redefined and developed through critical, problem-based and people-centered thinking.

The team is now implementing development projects worldwide: in the United States, in Europe, in South America -in particular, in Nicaragua, Honduras and Brazil, in Africa -in Lesotho and Mozambique, in India nationwide and will soon start in China. They join efforts with national authorities, as well as non-profits and community leaders to equip health posts and hospitals with ultrasound and tele-medicine technologies. They then empower the local medical and non-medical personnel of reference with their unique and tailored education curriculums, using innovative technologies as effective teaching tools. Their international development experience has also taught

them to go beyond the teaching of ultrasound and tele-sonography, by empowering the population with preventive health education. They have thus, developed “Healthy Living Education Kiosks” (<http://healthylivingkiosk.com/>), which through interactive apps and vignettes educate audiences of all ages and with a minimal literacy levels on how to make healthy living choices and lead a healthier lifestyle. The impact and empowering effect of the latter has been extraordinary across population members with diverse age ranges and backgrounds.

Moreover, the HFH-WINFOCUS team is incorporating their unique teaching of ultrasound in universities worldwide. They help a nation create a stream of trained professionals who bring better healthcare and ultrasound diagnostic capabilities to the whole country. In this manner, they are able to reach the remote districts and communities in the most self-sustainable and lasting way, with impacts both in the immediate and long-term.

Through tele-medicine, the team allows for both strengthening of the national healthcare system, as well as opening access to a global net of potential healthcare providers. Indeed, they have a tri-fold use of tele-sonography: first, to enhance communication and referral capabilities across health centers nationally; second, for long-term e-education and consultation; third, just-in-time remote guidance to newly trained personnel, who have minimal or no previous expertise in ultrasound, enabling them to perform effective, accurate and immediate diagnosis. Incorporating the use of these innovative technologies, through the team’s comprehensive approach is proving to be more cost-effective and sustainable than for a nation to train, hire and provide incentives for medical doctors to work in the remote and austere areas, whose population members lack access to important primary healthcare.

Finally, the HFH-WINFOCUS team work to develop both a local and a global network of alliances. Indeed, in every country they begin by working with national stakeholders: the ministries of health, of education, of innovation technologies, of development and of economics; the directors of all institutions involved and representatives and members from all communities concerned. They develop policies that integrate their technologies and approaches into the national system to resolve local needs. They also begin with a pilot project supported by the local authorities, which stands as a national milestone to set the base for broader, nation-wide and nation-led replicas and adaptations of the project. Thereby, they assure long-term sustainability and probable applications nation wide. Globally, they work with international institutions, amongst which the United Nations and the World Health Organization, and research networks, to drive universal policies and guidelines to incorporate the potential and optimal use of Ultrasound for Sustainable Development and Access to Diagnostic Healthcare.

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