Cardiology, Echocardiology & Telemedicine

Title	**Implanting telehealth network for paediatric cardiology: learning from the Quebec experience.**
Authors:	Bellavance M. Beland MJ. van Doesburg NH. Paquet M. Ducharme FM. Cloutier A.
Journal / Source:	Cardiology in the Young. 14(6):608-14, 2004 Dec.
Abstract:	The implementation committee of the Quebec Child Telehealth Network was formed in 1997, with a mandate to build a network dedicated to the diagnosis of congenital cardiac disease via telemedicine. We devised criterions for selection to determine which peripheral centres would be linked by telemedicine to the university-based services for paediatric cardiology provided in the Canadian Province of Quebec. The criterions included: distance from a university centre, number of births per year, and presence of an already-established outreach clinic for paediatric cardiology. The Quebec Network became operational in 2000, and was composed of 32 peripheral centres and 4 university centres. A total of 363 transmissions of echocardiograms occurred over a 3-year period from January 2000 to December 2002. Peripheral centres located at a distance greater than 100 kilometres from a university centre were 8.5 times more likely to use the network. Criterions other than distance did not influence whether or not a peripheral centre used the network. Cardiac abnormalities were identified in almost two-thirds of the transmissions. The use of the Quebec Network resulted in the avoidance of transfers or clinic visits to university hospitals in seven-tenths of cases. We conclude that distance greater than 100 kilometres from a centre offering subspecialty services in paediatric cardiology is the most important criterion for choosing the peripheral centres that are most likely to use a telehealth network. In its first three years of operation, the telehealth network had a major impact on the delivery of paediatric cardiac care, improving access to subspecialty services across the province.
Comment:	Referenced. Full Text. Excellent implementation of a paediatric cardiology telemedicine program. Linking remote centers to the main University hospitals. Those centers >100km distant from the University hospitals were most likely to use the tele-echocardiology service.
Full Text Link:	EBSCO Host Weblink
Full Reference:	Bellavance M, Beland MJ, Doesburg NHv, Paquet M, Ducharme FM, Cloutier A. Implanting telehealth network for paediatric cardiology: learning from the Quebec experience. Cardiol.Young 2004 Dec;14(6):608-614.

Cardiology, Echocardiology & Telemedicine

Title	**Telemedicine/telehealth: an international perspective. Clinical applications in telemedicine/telehealth.**
Authors:	Krupinski E. Nypaver M. Poropatich R. Ellis D. Safwat R. Sapci H.
Journal / Source:	Telemedicine Journal & E-Health. 8(1):13-34, 2002.
Abstract:	
Comment:	Referenced. Full Text. No abstract. A general review article (from 2002) covering a variety of telemedicine subjects, including telecardiology (beginning page 6.) Telecardiology is a 'maturing' subject but has not reached international acceptance due a lack of specific standards covering technology & protocols for example.
Full Text Link:	http://dx.doi.org/10.1089/15305620252933374 DOI: 10.1089/15305620252933374
Full Reference:	Krupinski E, Nypaver M, Poropatich R, Ellis D, Safwat R, Sapci H. Telemedicine/telehealth: an international perspective. Clinical applications in telemedicine/telehealth. Telemedicine journal and e-health : the official journal of the American Telemedicine Association 2002 May;8(1):13-34.

Cardiology, Echocardiology & Telemedicine

Title	The Ottawa telehealth project.
Authors:	Cheung ST. Davies RF. Smith K. Marsh R. Sherrard H. Keon WJ.
Journal / Source:	Telemedicine Journal. 4(3):259-66, 1998.
Abstract:	OBJECTIVE: To examine the telehealth system as a means of improving access to cardiac consultations and specialized health services in remote areas of Ontario. METHODS: The University of Ottawa Heart Institute has set up a telehealth test program, Healthcare and Education Access for Remote Residents by Telecommunications (HEARRT), in collaboration with industry and the provincial and federal government, as well as several remote clinical test sites. The program makes off-site cardiology consultations possible. History taking and physical examinations are conducted by video and electronic stethoscope. Laboratory results and echocardiograms are transmitted by document camera and VCR. The technology is being tested in both stable outpatient and emergency situations. Various telecommunications bandwidths and encoding systems are being evaluated, including satellite and terrestrial-based asynchronous transfer-mode circuits. Patient satisfaction and cost-effectiveness are also being assessed. RESULTS: Bandwidths from as low as 384 kbps using H. 320 encoders to 40 Mbps using digital transport of NTSC video signals have been evaluated. Although lower bandwidths are sufficient for sending echocardiographic and electrocardiogram data, bandwidths with transport speeds of 4 to 6 Mbps appear necessary to capture the nuances of the cardiac physical examination. A preliminary satisfaction survey of 19 patients noted that all felt that they could communicate effectively with the cardiologist by video, and each had confidence in the advice offered. None reported that he or she would rather have traveled to the doctor in person. Initial and projected examination of the costs suggested that telehealth will effectively reduce overall health care spending while decreasing travel expenses for rural patients. CONCLUSION: Telehealth technology is sufficiently sophisticated to allow off-site cardiology assessments. Preliminary results suggest there is a sound business case for the implementation of telehealth technology to meet the needs of remote residents in northern Ontario. Working closely with government and industry, we will develop a marketing and commercialization plan to support the use of this technology throughout Ontario and expand application to patient education and continuing medical education.

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Title	The Ottawa telehealth project.
Comment:	Referenced. No full text. A 10-year old article but already describes the successful telecardiology program tested by the Ottawa Heart Institute and remote Northern Ontario clinical test sites. Lower bandwidth (384 kbps) were sufficient for echo-scans transmission but broadband (3-6 Mbps) was best needed for tele / video cardiac examination. However patient satisfaction was high with significant travel cost savings.
Full Text Link:	
Full Reference:	Cheung ST, Davies RF, Smith K, Marsh R, Sherrard H, Keon WJ. The Ottawa telehealth project. Telemedicine journal : the official journal of the American Telemedicine Association 1998 Dec;4(3):259-266.

Cardiology, Echocardiology & Telemedicine

Title	**Tele-cardiology.**
Authors:	Molefi M. Fortuin J. Wynchank S.
Journal / Source:	Cardiovascular Journal of Southern Africa. 17(1):27-32, 2006 Jan-Feb.
Abstract:	After defining tele-medicine, we describe its situation in the public health service of South Africa and its application to cardiology. Methods of communication relevant to tele-cardiology are outlined, together with their bearing on primary healthcare. The range of tele-cardiological applications to electrocardiology, echocardiology, auscultation, imaging and pathology are indicated. Tele-cardiology's contributions to a range of cardiological problems and types of management are described briefly. Finally, a mention is made of the relevance of tele-medicine to education and the costs related to cardiology, with an indication of some future needs for tele-cardiology.
Comment:	Referenced. Full Text. A general overview of the application of the various forms of tele-cardiology in South Africa.
Full Text Link:	Use PubMed ID: 16547558 at http://www.ncbi.nlm.nih.gov/sites/entrez/ which contains link to full text PDF.
Full Reference:	Molefi M, Fortuin J, Wynchank S. Tele-cardiology. Cardiovascular journal of South Africa : official journal for Southern Africa Cardiac Society [and] South African Society of Cardiac Practitioners 2006 Jan;17(1):27-32.

Title	**TELEHEALTH HOME BASED EXERCISE AND DISEASE MANAGEMENT PROGRAM FOR MODERATE HEART FAILURE: A PILOT STUDY: Behavior/Lifestyle Modification; Cardiac Rehabilitation: Poster #73.**
Authors:	Winters, Jill M.; Papp, Mary Ann; Oldridge, Neil; Cashin, Susan; Seubert, Heather
Journal / Source:	Journal of Cardiopulmonary Rehabilitation & Prevention. 27(5):339, September/October 2007.
Abstract:	Each year nearly 5 million Americans are affected with heart failure (HF), it is the leading cause of death in the United States, and it is the single most costly healthcare challenge. Evidence-based practice guidelines from the American College of Cardiology/American Heart Association identified exercise as a key factor for managing HF. A fundamental symptom of HF is exercise intolerance, presenting limitations on functional status and quality of life (QOL). Historically, HF rehabilitation program implementation has been challenging. A user-centered telehealth-supported home-based exercise program with frequent feedback may increase adherence and improve exercise tolerance, HF symptoms, and QOL. Therefore, the purpose of this prospective 2-group experimental study was to compare effects of a 12-week telehealth disease management and home exercise rehabilitation program with usual treatment.
Comment:	Referenced. Full text.
Full Text Link:	OVID JumpStart Weblink
Full Reference:	Winters J, Papp M, Cashin S. PILOT STUDY OF TELEHEALTH HOME EXERCISE PROGRAM. J.Cardiopulm.Rehabil. 2006 Jan.

Cardiology, Echocardiology & Telemedicine

Title	**A multi-country randomised trial of the role of a new telemonitoring system in CHF: The HHH study (Home or Hospital in Heart Failure). Rational, study design and protocol.**
Authors:	Mortara A. Pinna G.D. Johnson P. Dargie H. La Rovere M.T. Ponikowski P. Tavazzi L. Sleight P.
Journal / Source:	European Heart Journal, Supplement. 6(6)(pp F99-F102), 2004. Date of Publication: Nov 2004.
Abstract:	The HHH study will be a full scale randomized controlled trial in Italy, Poland and UK enrolling 450 CHF patients (LVEF <40%, NYHA cl. II-IV) in 2 arms (usual clinical practice and home-care strategy). Objectives will be: (1) to determine if different strategies of home-care telemonitoring, affect hospital admissions, improve patient sense of well-being, and reduce overall costs of medical care; (2) to define the prevalence and the clinical impact of breathing disorders, arrhythmias and abnormalities of HRV in the occurrence of acute periods of instability and when on optimal therapy; (3) to evaluate in the home setting a new system for continuous monitoring of cardio-respiratory signals plus physical activity with teletransmission of recorded data embedded in an interactive voice response based telehealth system. The 300 'home strategy' patients will be divided into: (1) normal clinical practice supplemented by telephone contacts; (2) as strategy 1 plus periodic telemonitoring of vital signs parameters; (3) as 2deg; strategy plus periodic 24 h ECG, respiration and physical activity (NICRAM) recording. Enrolment will be over 12 months with a further 12 months follow-up. The primary end-point will be total bed-days occupancy for heart failure in acute medical/surgical beds. The first patient was enrolled in September 2002. The trial is expected to be completed at the middle of 2005.
Comment:	Referenced. Full Text. Outline of a RCT being developed investigating a number of cardiovascular factors and the effect that home-based telehealth monitoring system can have on inpatient bed-days and patient well-being.
Full Text Link:	DOI: http://dx.doi.org/10.1016/j.ehjsup.2004.09.003
Full Reference:	Mortara A, Pinna G, Johnson P, Dargie H. A multi-country randomised trial of the role of a new telemonitoring system in CHF: the HHH study... European Heart Journal Supplements 2004 Jan;6(F):F99-F102.

Title	**Home telemonitoring of vital signs and cardiorespiratory signals in heart failure patients: system architecture and feasibility of the HHH model.**
Authors:	Pinna GD. Maestri R. Andrews D. Witkowski T. Capomolla S. Scanferlato JL. Gobbi E. Ferrari M. Ponikowski P. Sleight P. Mortara A. Johnson P.
Journal / Source:	International Journal of Cardiology. 120(3):371-9, 2007 Sep 3.
Abstract:	BACKGROUND: The Home or Hospital in Heart Failure Study (HHH) is a European Community funded trial (QLGA-CT-2001-02424) which compares usual care of heart failure (HF) with three home-based interventions in a multicenter, multicountry (Italy, Poland and UK), randomized controlled clinical trial. Home telemonitoring (HT) of clinical parameters represents a potential alternative (or addition) to traditional home care models. Nocturnal respiratory disorders (periodic breathing, sleep apnea) are very common in HF, and are associated with increased morbidity and mortality. We developed an integrated HT system for monitoring of both vital signs and respiration. All measurements were patient-managed. This paper describes the architecture of this system, and assesses its feasibility. METHODS AND RESULTS: 461 clinically stable patients were randomized first to usual vs home-monitored care; the latter were further randomized to 3 strategies. Over a 12-month follow-up 2 of these 3 groups (195 patients, age: 60+/-11 years, NYHA class II-III: 97%, LVEF 28+/-7%) underwent self-administered home monitoring of vital signs (weekly--12 parameters using an interactive voice response system) and respiration (monthly--24-hour recording). Data were transmitted over conventional telephone lines; 81% of actually practicable vital signs measurements were completed by the patients (range: 75% (PL)-93% (UK)), as well as 92% of practicable respiratory recordings (range: 85% (PL)-99% (UK)). 87% of nighttime recordings were eligible for the study (good quality signals for > or = 2.5 h). CONCLUSIONS: This study, the largest so far, demonstrates that self-managed home telemonitoring of both vital signs and respiration is feasible in HF patients, with surprisingly high compliance. We found an excellent rate of acceptable nocturnal respiratory recordings, which are those with the greatest clinical relevance.

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Comment:	Referenced. Full Text. Description of one of the largest RCTs of self-managed home telemonitoring of cardiovascular & respiratory vital sign data in chronic heart failure patients. The study demonstrated that self-monitoring by patients with telehealth follow-up is feasible and acceptable.
Full Text Link:	DOI: http://dx.doi.org/10.1016/j.ijcard.2006.10.029
Full Reference:	Pinna GD, Maestri R, Andrews D, Witkowski T, Capomolla S, Scanferlato JL, et al. Home telemonitoring of vital signs and cardiorespiratory signals in heart failure patients: system architecture and feasibility of the HHH model. Int.J.Cardiol. 2007 Sep;120(3):371-379.

Cardiology, Echocardiology & Telemedicine

Title:	**Impact of Telehealth on Healthcare Utilization by Congestive Heart Failure Patients.**
Authors:	Lehmann, Craig A; Mintz, Nancy; Giacini, Jean Marie
Journal / Source:	Disease Management & Health Outcomes. 14(3):163-169, 2006.
Abstract:	See Below.
Comment:	Referenced. Full Text. A federally-funded small scale demonstration project to see whether teleheatlh technology could be used to decrease chronic heart failure patients utilization of healthcare facilities. Overall this small scale project showed some significant savings suggesting that telehealth could be used as a new form of service delivery that may improve healthcare but at a lower cost.
Full Text Link:	EBSCOHost Weblink
Full Reference:	Lehmann C, Mintz N, Giacini J. Impact of Telehealth on Healthcare Utilization by Congestive Heart Failure Patients. Disease Management & Health Outcomes 2006 Jan.

Impact of Telehealth on Healthcare Utilization by Congestive Heart Failure Patients.

ABSTRACT:

Background: Advances in telehealth are proving to be extremely conducive to effective management of congestive heart failure (CHF) and other disease states, particularly in ambulatory settings. In order to assess the impact of telehealth on healthcare utilization in CHF patients, telehealth technology was introduced into a demonstration project established by the Secretary of Health and Human Services. Demonstration projects examine health delivery factors that encourage the delivery of improved quality of care and have already implemented protocols to evaluate methods to improve quality of care and reduce expenditures provided to Medicare beneficiaries with chronic conditions (including methods to permit Medicare beneficiaries to direct their own healthcare needs and services). This study, funded in June of 2002 by the Centers for Medicare and Medicare Services, focused on The Jewish Home & Hospital Services, Lifecare Plus (New York, NY, USA), one of the US's federally funded national demonstration projects. The study measured the impact of managing CHF patients via telehealth technology on overall healthcare utilization, physician office visits, emergency department (ED) visits, and hospital readmissions.

Methods: To be eligible for the Jewish Home & Hospital Services Lifecare Plus demonstration project, patients had to be aged >=65 years, have both Medicare parts A & B, have had at least three doctor visits or one hospitalization in the previous 12 months, reside at a Manhattan or Bronx address in New York, and have one of the following diagnoses: heart disease, diabetes, liver disease, lung disease, vascular disease, cerebrovascular disease, psychotic major depression or anxiety, cancer, Alzheimer disease, or dementia. This particular study included 20 homebound CHF patients, of whom 10 were in the telehealth study group and 10 were in the control group.

Results: The findings demonstrated that patients managing their CHF via telehealth technology decreased their overall utilization of healthcare resources by 41% (p = 0.00183). Physician office visits decreased by 43% (p = 0.00253), ED visits by 33% (p = 0.3770), and hospitalizations by 29% (p = 0.3872).

Conclusions: The significant reduction in overall healthcare utilization and physician office visits demonstrate that this technology could offer significant cost savings for long-term disease management and could
offer clinicians a new form of service delivery that may improve the quality of care. Hopefully, the outcomes of this study will serve as a catalyst for future larger studies, thus reducing the obvious limitations associated with small studies such as this one.

Cardiology, Echocardiology & Telemedicine

Title	**Feasibility of remote echocardiography with satellite transmission and real-time interpretation to support medical activities in the austere medical environment**
Authors:	Linda L Huffer, Terry D Bauch, James L Furgerson, James Bulgrin, Sheri Y N Boyd
Journal / Source:	Journal of the American Society of Echocardiography : official publication of the American Society of Echocardiography 2004 vol. 17 (6) pp. 670-4
Abstract:	Echocardiography is an essential tool in the evaluation of patients with cardiac emergencies and chest trauma. The objective of our study was to establish the feasibility and diagnostic accuracy of a portable satellite transmission system in the assessment of cardiac emergencies for the real-time support of mass casualty and humanitarian relief efforts. Twelve patients with various degrees of cardiac structural disease identified by conventional inhospital transthoracic echocardiography were transported to a remote portable field hospital where transthoracic echocardiography was performed with a handheld echocardiographic device. Images were then relayed by a commercial satellite to a level III trauma center where they were interpreted in real time by a cardiologist. Remote studies were recorded at the field hospital before satellite transmission and again on download at the receiving facility. The remotely acquired studies before and after satellite transmission were compared with each other and subsequently compared with conventional hospital transthoracic echocardiograms for technical quality and diagnostic accuracy using a blinded, single-reader, side-by-side comparison. Excellent agreement was found between the recorded field-site and satellite-transmitted images with an overall average of 95% concordance. When the field data acquired with the handheld device and satellite transmission were compared with conventional inhospital echocardiography, a high degree of agreement was demonstrated in overall technical quality (83%) and assessments of left ventricular ejection fraction (100%), pericardial effusion (100%), and left ventricular size (92%). This study demonstrates the feasibility and diagnostic accuracy of remote, real-time echocardiography using satellite transmission for mass casualty triage or humanitarian relief efforts.
Comment:	Referenced. No full text subscription.
Full Text Link:	http://dx.doi.org/10.1016/j.echo.2004.03.021

Full Reference:	Huffer LL, Bauch TD, Furgerson JL, Bulgrin J, Boyd SYN. Feasibility of remote echocardiography with satellite transmission and real-time interpretation to support medical activities in the austere medical environment. Journal of the American Society of Echocardiography : official publication of the American Society of Echocardiography 2004 Jun; 17(6):670-674.

Title	**Impact of telemedicine on the practice of pediatric cardiology in community hospitals**
Authors:	Craig A Sable, Susan D Cummings, Gail D Pearson, Lorraine M Schratz, Russell C Cross, Eric S Quivers, Harish Rudra, Gerard R Martin
Journal / Source:	Pediatrics 2002 vol. 109 (1) pp. E3
Abstract:	See Below.
Comment:	Referenced. Full Txt. A large-scale evaluation of the use of desk-top video conferencing equipment and echocardiography for real-time paediatric / neonatal cardiology. Designed to allow community / smaller hospitals access to specialised neonatal cardiological review without the need for excessive patient transport. Overall real-time VC transmission of echos can improve patient care, allow access to specialised services from the Community hospital, while maintaining an accurate service.
Full Text Link:	Impact of Telemedicine on the Practice of Pediatric Cardiology in Community Hospitals
Full Reference:	Sable CA, Cummings SD, Pearson GD, Schratz LM, Cross RC, Quivers ES, et al. Impact of telemedicine on the practice of pediatric cardiology in community hospitals. Pediatrics 2002 Jan;109(1):E3.

Impact of telemedicine on the practice of pediatric cardiology in community hospitals

ABSTRACT:

BACKGROUND: Tele-echocardiography has the potential to bring real-time diagnoses to neonatal facilities without in-house pediatric cardiologists. Many neonates in rural areas, smaller cities, and community hospitals do not have immediate access to pediatric sonographers or echocardiogram interpretation by pediatric cardiologists. This can result in suboptimal echocardiogram quality, delay in initiation of medical intervention, unnecessary patient transport, and increased medical expenditures.
Telemedicine has been used with increased frequency to improve efficiency of pediatric cardiology care in hospitals that are not served by pediatric cardiologists.

Initial reports suggest that telecardiology is accurate, improves patient care, is cost-effective, enhances echocardiogram quality, and prevents unnecessary transports of neonates in locations that are not served by pediatric cardiologists. OBJECTIVE: We report the largest series to evaluate the impact of telemedicine on delivery of pediatric cardiac care in community hospitals. We hypothesized that live telemedicine guidance and interpretation of neonatal echocardiograms from community hospitals is accurate, improves patient care, enhances sonographer proficiency, allows for more efficient physician time management, increases patient referrals, and does not result in increased utilization of echocardiography. METHODS: Using desktop videoconferencing computers, pediatric cardiologists guided and interpreted pediatric echocardiograms from 2 community hospital nurseries 15 miles from a tertiary care center. Studies were transmitted in real-time using the H.320 videoconferencing protocol over 3 integrated services digital network lines (384 kilobits per second). This resulted in a frame rate of 23 to 30 frames per second. Sonographers who primarily scanned adult patients but had received additional training in echocardiography of infants performed the echocardiograms. Additional views were suggested as deemed necessary by the interpreting physician, and interpretations were made during the videoconference. The results of the echocardiogram and recommendations for patient care were communicated to the referring physician over the telemedicine system. Analyses of accuracy, patient treatment, echocardiogram quality, time to diagnosis, pediatric cardiologist practice time management, patient referral patterns, and echocardiography utilization were conducted prospectively.
RESULTS: A total of 500 studies in 364 patients were transmitted during a 30-month period. The most common indication for echocardiography was to rule out congenital heart disease (208 of 500 studies). Signs and symptoms that prompted this concern included cyanosis, murmur, tachypnea, genetic syndrome, arrhythmia, abnormal fetal echocardiogram, and maternal diabetes. Other indications included suspected patent ductus arteriosus (PDA; 182 of 500 studies), intracardiac clot or catheter position, persistent pulmonary hypertension, and hemodynamic instability. Cardiac diagnoses included complex congenital heart disease (n = 16), noncritical heart disease (n = 107), and PDA (n = 86). Additional diagnoses included persistent pulmonary hypertension (n = 12), septal hypertrophy (n = 18), right atrial mass/clot/vegetation (n = 11), and decreased cardiac function (n = 6). An umbilical venous catheter was visualized in the left atrium in 9% (45 of 500) of all studies. No significant abnormalities were found in 244 studies. Major diagnoses were confirmed by subsequent review of videotape in all studies. Comparison of final videotape interpretation to initial telemedicine diagnosis resulted in 1 minor diagnostic change (membranous versus inlet ventricular septal defect). Echocardiograms were performed in subsequent visits in 264 patients. The diagnosis was altered in 3 patients. Telemedicine had an immediate impact on patient care in 151 transmissions. The most common interventions were indomethacin treatment for PDA (n = 76), retraction of umbilical venous catheters from the left atrium (n = 45), inotropic or anticongestive therapy (n = 19), anticoagulation (n = 8), and prostaglandin infusion (n = 8). Nineteen patients were transported to our hospital because of the telemedicine diagnosis. Inpatient or outpatient cardiology follow-up was recommended in an additional 131 studies and did not result in any change in the initial management. The most common diagnoses in these patients were ventricular septal defect (n = 56), atrial septal defect (n = 21), septal hypertrophy (n = 9), intracardiac thrombosis (n = 8), and pulmonary valve stenosis (n = 4). We speculate that the immediate availability of an echocardiographic diagnosis likely prevented unnecessary transport in 14 cases. Recommendations for additional views or adjustment of echocardiography machine settings were made in 95% of transmissions. Real-time guidance was especially helpful in suprasternal notch and subcostal sagittal imaging. Depth, color Doppler sector size, and color Doppler scale were frequently adjusted from routine adult settings during the teleconference.

The average time from request for echocardiogram to completion of the videoconference was 28 +/- 14 minutes. This was significantly shorter than the waiting time (12 +/- 16 hours) for the videotape to be delivered by courier. Telemedicine eliminated the need for consultation in 194 cases and allowed the cardiologist to delay the visit until the end of the day in an additional 26 cases. This resulted in average time savings of 4.2 person-hours/ wk based on travel and consultation time. Utilization of echocardiography was similar before (35 of 1000 births) and after (33 of 1000 to 43 of 1000) telemedicine installation. The percentage of neonatal echocardiograms that were interpreted by our practice increased from 63% to 81% at 1 hospital and from 0% to 100% at the other hospital. CONCLUSION: Real-time transmission of neonatal echocardiograms from community hospitals over 3 integrated services digital network lines is accurate and has the potential to improve patient care, enhance echocardiogram quality, aid sonographer education, and have a positive impact on referral patterns and time management without increasing the utilization of echocardiography.

Cardiology, Echocardiology & Telemedicine

Title	**Emergency echocardiography telemedicine: an efficient method to provide 24-hour consultative echocardiography**
Authors:	J A Trippi, K S Lee, G Kopp, D Nelson, R Kovacs
Journal / Source:	J Am Coll Cardiol 1996 vol. 27 (7) pp. 1748-52
Abstract:	OBJECTIVES: This study sought to assess the clinical utility of interpreting emergency echocardiograms after regular working hours through a telemedicine connection to on-call cardiologists. BACKGROUND: Physician interpretation of emergency echocardiograms is often delayed during weekends, evenings or night hours. This delay places undue responsibility on less qualified personnel to interpret echocardiograms of vital importance. METHODS: Digital quad-screen cine-loop format was transmitted over standard telephone lines. Clinical data and conventional and telemedicine interpretations were collected prospectively for 187 emergent or semiemergent tele-echocardiograms after regular working hours. RESULTS: Indications for the echocardiogram included assessment of left ventricular function, ischemia, pericardial effusion, valvular disease, heart donor status and arrhythmia. Three off-site echocardiographers received the standard echocardiogram and spectral, gray-scale and color flow Doppler images in cineloop format using a laptop computer. Laptop interpretation showed 19 technically limited studied, 153 abnormal studies and 54% with wall motion abnormalities. Overall mean agreement rate between telemedicine laptop interpretation and conventional workstation interpretation performed in blinded manner for serious disorders with classic echocardiographic findings (pulmonary hypertension, left ventricular thrombus, aortic dissection, severe valvular insufficiency and large pericardial effusion) was 99.0% (95% confidence interval [CI] 96% to 99%). For serious wall motion abnormalities, the agreement rate was 96.3% (95% CI 92% to 99%). The following mean times elapsed after completion of the echocardiogram: to laptop fax report, 2.14 (range 10 min to 8 h); to dictation of videotape, 11.74 h ($p < 0.001$); to transcription of videotape diction, 56.6 h ($p < 0.0001$). CONCLUSIONS: After-hours emergency echocardiography telemedicine using a laptop computer is more rapid than scheduled conventional interpretation from a videotape workstation, yet diagnostic accuracy is comparable.
Comment:	Referenced. Full Text. A 12-year old Article, but shows that even then using images transmitted over regular dial-up, it was possible to get rapid Cardiologist interpretation of emergency echocardiograms.
Full Text Link:	http://dx/doi.org/10.1016/0735-1097(96)00042-3 ScienceDirect Weblink
Full Reference:	Trippi JA, Lee KS, Kopp G, Nelson D, Kovacs R. Emergency echocardiography telemedicine: an efficient method to provide 24-hour consultative echocardiography. J.Am.Coll.Cardiol. 1996 Jun;27(7): 1748-1752.

Cardiology, Echocardiology & Telemedicine

Title	**Accuracy of routine echocardiographic measurements made by an inexperienced examiner through tele-instruction**
Authors:	J E Afset, P Lunde, K Rasmussen
Journal / Source:	Journal of telemedicine and telecare 1996 vol. 2 (3) pp. 148-54
Abstract:	The reproducibility and accuracy of routine echocardiographic measurements made by an inexperienced doctor using tele-instruction were evaluated. Thirty-eight patients were first examined at a local hospital by an inexperienced doctor instructed by a specialist 450 km away at a university hospital. The specialist then examined the patients at the local hospital using the same equipment, after an average of 50 days. The accuracy of M-mode and quantitative Doppler measurements was comparable to that observed in reproducibility studies made under normal examination conditions. There were no systematic measurement errors. No important M-mode information was missed except evidence of left ventricular hypertrophy in six patients. In the two-dimensional examination there were differences of clinical significance in only three patients. There were no clinically important differences in the Doppler quantification of mitral and aortic regurgitation. Tele-instructed echocardiography is also an excellent educational tool, allowing an inexperienced examiner gradually to take responsibility for the local echocardiographic service.
Comment:	Referenced. Full Text. Again another dated (12 year old article) but describes how an inexperienced user can be instructed on echocardiographic examination over tele-instruction, allowing remote specialist 'examination' on the patient as well as educating the local inexperienced user. However, very high qulity
Full Text Link:	IngentaConnect Weblink
Full Reference:	Afset JE, Lunde P, Rasmussen K. Accuracy of routine echocardiographic measurements made by an inexperienced examiner through tele-instruction. J.Telemed.Telecare 1996 Jan;2(3):148-154.

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Title	
Authors:	
Journal / Source:	
Abstract:	
Comment:	
Full Text Link:	
Full Reference:	