Island-wide Women's Health Project

Background and Statement of Problem

The structure of two large volume aspects of obstetrics and gynecology, prenatal care and colposcopic monitoring for pre-malignant macroscopic cervical pathology represent unique health care algorithms with clearly defined timeframes and natural courses which lend themselves to codified care plans. Prenatal care is perhaps the most common primary care function delivered and as such has been provided on a well described schedule of visits to health care providers for monitoring of progress and surveillance for pathology. It is the epitome of a healthy process where the expectations are for a good outcome. In the majority of cases, care can be provided in a low intensity outpatient facility with a single episode of inpatient care for monitoring during delivery. Much of the progress in the past century leading to dramatic reductions in maternal and infant death can be attributed to the provision of early intervention for known pathology of pregnancy, particularly during labor and delivery. In a small proportion of cases, high acuity obstetric and neonatal care are necessary, supported by subspecialty physicians with a large infrastructure of medical, nursing, ancillary specialties, and a high capital investment physical facility. Outpatient monitoring of pre-malignant cervical pathology represents the opposite end of the spectrum with an abnormal condition, which leads to a severe pathology, cervical cancer, requiring high intensity medical and surgical care. The common thread with these two areas of obstetrics and gynecology are the high prevalence, screening processes delivered through outpatient primary care facilities and the necessity for subspecialty referral on a regular basis.

In the United States military health care system, obstetric and gynecologic care are provided in three care models; complete care at a tertiary care facility with internal referral to subspecialists, primary and limited specialized care at large community hospitals with transfer to military or civilian tertiary care facilities, and primary care at small community hospitals or clinics with referral and disengagement for most specialty care to tertiary care facilities, either military or civilian. In the instances when time is not critical, referral has been mandated to distant military tertiary care facilities, even when equivalent civilian capability exists locally, to maximize utilization of high capital investment government facilities. The Pacific region utilizes a combination of the first and third models with virtually all care on the island of Oahu being provided at Tripler Army Medical Center, the tertiary care facility for the three military services while all other facilities in the Pacific basin (Guam, Japan, Korea) are community hospitals with no subspecialty capability. The unique feature of the Pacific region is the lack of nearby subspecialty care outside of Hawaii and the great distances separating the community facilities from the referral center. Transportation of patients for simple consultation requires air travel taking several days. Provision of obstetric care, even outpatient, frequently requires long-term domicile in Hawaii for lack of specialty capability in the referring overseas site. Attempts to establish subspecialty care in the vicinity of the remote Pacific sites (Okinawa) have been ineffective due to a lack of the requisite infrastructure despite placement of the appropriate subspecialty physicians in theatre.

With the advent of managed care and the emphasis on efficiency of resource utilization, the traditional delivery of primary obstetric and gynecologic care at a centralized tertiary care facility must be reexamined. In a cost/outcome assessment of 142 military treatment facilities for obstetrics care in a series of three annual reviews, large tertiary facilities consistently utilized greater resources per capita than smaller facilities even when adjusted for higher acuity patients. This may be attributed to the high overhead for maintenance of subspecialty capability amortized over all patients, regardless of their need for such capability. The new paradigm is the provision of primary care at primary care facilities with screening of referral to tertiary care facilities to obtain maximum utilization of lower cost facilities for the majority of care and limitation of subspecialty care to those cases which truly require such costly expertise.

Research Questions and Hypothesis

This research and development effort will address the following research questions:

- Can remote ultrasound and colposcope low-bandwidth (store and forward) image technologies be used for the delivery of women's health care?
- Can remote ultrasound and colposcope low-bandwidth images be used to perform remote consultations?

- What are the ultrasound and colposcope low-bandwidth image requirements (e.g., number, and resolution) to provide accurate remote consultations?
- Can women's health care be provided at remote clinics?
- Does providing women's health care at remote clinics reduce tertiary facility costs?
- Is there a reduction in lost work hours by having women's health care provided at remote clinics?

Project Description (proposed solution)

The purpose of this project is to provide prenatal care and colposcopy at remote primary care sites where the majority of prenatal care and colposcopy can be provided by primary care physicians. Primary care providers will use on-site ultrasound machines and colposcopes for examination of the patients. Ultrasound and colposcopy low-bandwidth (store and forward) images will be reviewed and validated by the referral facility, again without actual patient transfer to the tertiary site. Validation of this concept will allow more cost-effective delivery of women's health with continuous quality assurance to the many remote locations in the military health care system, thereby improving military readiness, maintaining the health of our patients, and increasing the efficiency of resource utilization.

This is a prospective, controlled cohort study of telemedicine for the delivery of comprehensive prenatal care and specialized gynecologic care in remote health care sites with primary care physicians linked to a centralized tertiary care facility; measuring indices of quality of care, patient satisfaction, and costs both direct and indirect. Furthermore, this serves as a test-bed for implementation in far remote sites throughout the Pacific region to replace transfer of patients to the central tertiary care facility in Hawaii. In a phased approach, basic prenatal care will be provided with referral to the tertiary care facility for subspecialty consultation and inpatient procedures, implementation of colposcopy with transmission/archiving of static images for subspecialist review at the tertiary care facility, a demonstration of the feasibility of teleradiology for obstetric ultrasound in both batch processing of static images and real-time video clips and real-time dynamic imaging, implementation of teleradiology at the remote sites for all routine and screening obstetric ultrasound for the cohort. Measures of outcome will be completion of scheduled laboratory sets, proportion of scheduled obstetrics appointments kept, referral for indication, and fraction of inappropriate appointments/interventions/referral, concurrence of diagnosis from on-site imaging (ultrasound and colposcopy) with remote viewing of transmitted low-bandwidth images.

The capability to shift patient care to primary care clinics in the vicinity of the workplace will reduce time spent for medical care and lost worktime for active duty members. Remote consultation through the electronic record and images will allow active duty members to remain at their remote duty stations rather than physically appear at the central tertiary care facility. This is particularly relevant to the Pacific Region where the distance between remote sites and the referral center is several thousand miles. Furthermore, utilization of similar systems aboard ships and in deployed units will maintain readiness without compromise of healthcare for the active duty members far from fixed medical facilities.

Proposed Project Timeline

Once funding has been released, the following timeline will be implemented.

	Time (in months)											
Milestones	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Treatment protocols established with appropriate individuals and facilities (Tripler, Oahu Clinics)	X											
2. Identify and procure equipment for one remote site.	X											
3. Install and test hardware and software at Tripler for initial trials of remote imaging acquisition and retrieval.		X										
4. Perform in-house clinical trials.		X	X									
5. Install and test hardware and software at one Oahu clinic for remote imaging acquisition and retrieval.			X									
6. Conduct remote imaging acquisition and retrieval with one remote site.			X	X	X	X	X	X	X	X	X	X

Milestones	Time (in months) 1	2	3	4	5	6	7	8	9	10	11	12
7. Collect imaging validation data.		X	X	X	X	X	X	X	X	X	X	X
8. Analyze initial data and document results.				X	X	X						
9. Identify and procure equipment for two additional remote sites.							X					
10. Install and test hardware and software at two additional remote sites.								X				
11. Conduct remote imaging acquisition and retrieval with two additional remote sites.								X	X	X	X	X
12. Analyze data and document results to include: Remote imaging requirements; Remote imaging validation; Measures of patient/provider comfort/comprehension/satisfaction; Measures of business process re-engineering									X	X	X	X
13. Expand remote imaging acquisition to Pacific Basin sites.												X
14. Quarterly Progress Reviews			X			X			X			X

Performance Objectives/Deliverables

- Documented ultrasound and colposcope low-bandwidth (store and forward) image requirements to perform remote consultations.
- Women's health services being provided remotely utilizing Oahu clinics.
- Demonstrated the safety, cost effectiveness and positive clinical outcome of low-bandwidth imaging technologies.
- Women's health services being provided remotely in Pacific Basin sites.
- Two papers accepted for publication in peer review journals.