Remote Health Assessment Using a Frequency-Based GSR Stress Bio-Survey Technology – A Pilot Study in China

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Background

The Chinese healthcare system is experiencing major challenges resulting from the introduction of a market economy in 1978. The present existence of healthcare inequities in funding, access, costs and quality, especially in rural areas, has encouraged the Chinese government to look for new technology to monitor and assess the health of the rural population. We undertook a pilot study of the health status of residents of Beijing by the Chinese military, comparing the results of a frequency-based GSR stress bio-survey technology and a comprehensive physical exam.

Methods

We measured 200 Beijing residents, 140 males and 60 female ages 22-70 years old, consecutively entering the Physical Health Examination Center, Chinese PLA General Hospital in Beijing for their annual physical exam. Each subject underwent a two day physical exam and a 4 minute assessment with a frequency-based GSR stress bio-survey instrument. The data of both assessments were collected and analyzed.

Findings

Health status was measured as the documentation of significant pathology or functional disturbance in the major organ systems as designated by ICD-9 diagnosis (physical exam) or significant deviations in GSR bio-stress organ readings over baseline levels (instrument), respectively. The results showed 87% congruency in the disease assessment of two or more of the four primary diagnosed unhealthy or stressed organ systems.

Interpretation

The results of this pilot experiment show the possibilities of utilizing remote technology in monitoring the health status of patients in rural and underserved areas.

Abstract

A pilot study of the feasibility of using a frequency-based decision support technology to monitor health status and triage medical referral in 200 Beijing residents was undertaken by the Chinese People's Liberation Army. Comparison of a two day physical exam to a four minute

frequency-based stress bio-survey revealed diagnostic agreement in a majority of the major organ systems.

Key Words

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Introduction

Global health, and its accurate measurement, has become an important scientific activity to ensure the rational application of precious national resources to meet the changing health needs of developing and evolving nations. One of the key activities that is needed to strengthen the scientific basis of health and metrics, according to Murray and Frenk is the 'development of new methods, instruments, software, and hardware'.[1] No country is more aware of a need to measure its state of health and to develop new technology and policy to do so, than the People's Republic of China.

Background

China used a communistic healthcare system from 1952 to 1982 called the Cooperative Medical System. This system operated village and township health centers that were staffed by the so called 'barefoot doctors', who, with basic healthcare training, provided Western and Traditional Chinese medical care and public health services. The practitioners were acknowledged as effectively meeting the needs of rural populations.[2] All doctors and hospitals were owned and operated by the government who adopted a strong centralized control over public health and the provision of healthcare. During this period, this system achieved enormous improvements in infant mortality and life expectancy.[2] In 1978 Deng Xiao Ping introduced the elements of a market economy into China. This was a policy aimed at privatizing China's economy and

reducing the role of Beijing's central government in China's regional and local affairs. An unintended consequence of these policies was the dismantling of the entire Cooperative Medical System with no planned replacement. In addition, during the 1990s, significant healthcare reforms were introduced which led to a new emphasis of profitability, economic autonomy for health care facilities, and decentralization of public health services.[3-5] These reforms also produced fundamental changes in health care financing, replacing free universal healthcare with fee-for-service and private insurance strategies.[3,6] All these policy and funding changes have contributed to an increase in healthcare costs, higher out-of-pocket expenses, growing inequity to healthcare access between the urban and rural populations, a reduction of prevention programs in the poorer areas, and a pricing policy that encourages the overprescribing of drugs and high-tech services by facilities and doctors alike.[3,6,7-9] These changes have affected the rural areas the most, both in terms of lower funding and quality of care. The 'bare foot' doctors now are more likely to be pushing drugs, IV fluids and unnecessary treatment, than attending to public health concerns for which they are no longer paid.[6]

Aware that their health care is poorer in quality, rural residents with serious illnesses frequently bypass local practitioners and facilities to seek care in the outpatient units of urban hospitals, leading to underuse of the former, overuse of the latter, and increased fiscal burdens on peasants who seek out more expensive, hospital-based services. Health expenses are a leading cause of poverty in rural areas and a major reason that peasants migrate to cities seeking proximity to better health care facilities and higher wages to pay for care.[10] It is this rural sector of the population that is the most worrisome, from a population and political point of view. The under serviced peasant farmers number approximately 800-900 million and the Communist Party is all too aware that the last revolution was a peasant revolution.[7] A recent survey of people living in China by the National Bureau of Statistics (NBS) showed that rising medical costs is their main concern. [11]

In addition to these socio-economic and medical issues, recent interviews of Traditional Chinese Medicine (TCM) practitioners shows the move away from traditional Chinese and herbal medicine towards Western medicine amongst younger, more educated people with busy life styles and no time for frequent visits and the preparation of herbal teas. Even students attending TCM colleges often pursue non-TCM careers in Western healthcare settings on graduation. One interviewed journalist referred to TCM as 'antiquated, non scientific and based on superstition'.[12] It is with these facts and circumstances in mind that the Chinese government has taken the initiative to investigate new technologies to address the inequalities in healthcare in the rural areas of the country. China's health minister, Chen Zhu, speaking at the national Health Forum in Beijing in January, 2008, said that 'the Healthy China 2020 program would provide a universal national health service and promote equal access to public services'. In addition, China's medical and health reform will "follow a path with Chinese characteristics" Vice Minister of Health, Gao Qiang, told the conference. Xinhua News said this was the first time the government has used this expression. He explained that China is not going to blindly imitate "foreign models" because that would only lead to mistakes.[13] One of the components to care

was going to be the modernization and reintroduction of Traditional Chinese Medicine as an equal contributor to any healthcare solution. [14]

The Physical Health Examination Center of the People's Liberation Army General Hospital in Beijing has been given the task of investigating new technology to assess and triage the rural population seeking health care as to the most appropriate facility and means of treatment. With this directive in mind, new technology aimed at facilitating medical access, assessment and triage via a frequency based GSR stress bio-survey technology (Balance 3.0, Zyto Corporation, Orem, Utah, USA) was examined and compared to a standard comprehensive two day physical exam at the Physical Health Examination Center.

Methods

Selection and Description of Participants

A dual health assessment of the first 200 patients, 140 males and 60 female ages 22-70 years old, consecutively entering the Physical Health Examination Center, Chinese PLA General Hospital in Beijing for their annual physical exam, was made. Subjects were measured through a hand cradle interface for 4 minutes, randomly once between 8.00 am and 6.00 pm during their two day stay. The data of their physical exam and the frequency-based GSR stress bio-survey was collected and analyzed.

Technical Information

The Physical Health Examination Center

The standard physical exam at the Physical Health Examination Center is arguably the most comprehensive in the world. The subjects come into the building, change into pajamas and stay overnight for 48 hours of continuous physical, laboratory and procedural assessment.

Background Principles of Frequency-Based GSR Biosurveys

The basic concept for all of the frequency-based medical decision technology devices was the discovery in the 1940s by Dr. Reinhardt Voll, that the electrical resistance of the human body is not homogenous and that energy lines existed over the body which could be demonstrated as electrical fields. By the 1950s Voll had documented that the body had at least 1000 points on the skin which followed the 12 lines of the classical Chinese meridians. [15] Each of these points, Voll called a Measurement Point (MP). Working with an engineer, Fritz Werner, Voll created an instrument, the Dermatron, to measure the skin resistance at each of the acupuncture points, patterned after a technique called Galvanic Skin Resistance (GSR). In 1953, Voll had established the procedure that became known as Electro-Acupuncture according to Voll (EAV).[16] Voll showed that each acupuncture point acted as an electronic information access window into the body, each point being connected to and representing an organ or part of an organ or an organ function. This information was the first Western correlation of Chinese acupuncture theory. [17]

In spite of the electrical activity and the many electrical parameters emanating from the brain, nervous system and the heart, none of them give a whole body assessment regarding the state of bodily stress and the body's capability of offsetting the stressors. The new frequency-based GSR bio-communicating devices can be programmed to assess the stress-related biological susceptibility, body responses and the allostatic load.[18] They can also define the cause of the stress in the body and what further medical investigation or treatment would be appropriate for that individual at that time. Professor William Tiller has, for the last 30 years, conducted extensive experimentation to explain the physics of such instruments and the interface between frequency-based instruments, galvanic skin resistance and biological information.[19-24] See Appendix The output of these devices can be tailored to be in the language of Western medicine or expressed as a Traditional Chinese Medicine (TCM) diagnosis. Results may be remotely monitored utilizing the internet, phone lines or cell phone connections. Nine instruments were assessed at the Intemedica-Yihe Baojian Hospital No 1 in Beijing. The Zyto Corp, Balance 3.0 was selected for the pilot study based on accuracy, ease of use, patient acceptance, and low cost.

Findings

The results of the physical exam were tabulated as ICD-9 diagnoses [25] for the first 10 diagnoses reported in The Main Test Report of the Physical Health Examination center. The top 10 diagnoses are seen in Table 1.

Table 1. ICD-9 Diagnoses

ICD-9 Diagnosis	Diagnosis	% of Diagnoses
571.0	Fatty Liver – mild to moderate	17.75%
401.0	Essential Hypertension	13%
272.1/2	Hyperlipidemia	11.5%
535.5	Chronic Gastritis/ H. Pylorii +ve	10%
472.1	Chronic Pharyngitis	9.25%
372.1	Chronic Conjunctivitis	8.75%
278.02	Overweight	8.75%
217.0	Breast Hyperplasia (Females)	7.75%
723.8	Cervical Syndrome	6.5%
722.4	Cervical Degenerative Discs	6%

The organ stress results of the Balance 3.0 Bio-communication device, were tabulated - Table 2.

Table 2. Organ Stress Results Readout from Zyto Balance 3.0

Balance 3.0 Stressed Organs	Total %
Bladder	12.5%
Endocrine	9%
Gall Bladder	3%
Heart	9%
Kidney	11%
Large Intestine	13.5%
Liver	3%
Lung	14%
Pancreas	3%
Small Intestine	10.5%
Spleen	2%
Stomach	8.5%

In order to compare diagnoses to organ stress profiles, the results of both assessments were expressed as the involved organ systems, keeping the sequence of reporting (most important diagnosis to less important - the physical exam) and the organ stress sequence (most stressed to least stressed - Balance 3.0). Musculoskeletal disorders were not considered in the comparison, as the only way to assess these changes was by physical imaging.

A comparison was made between the organ system percentage shown by the Balance 3.0 and the Physical Exam - Table 3.

Table 3. Comparison of Organ System Diagnoses of the Balance 3.0 vs. The Physical Exam

Organ System	Balance 3.0 Percentage	Physical Exam Percentage
Cardiovascular	14	16.5
Endocrine	16.5	22.0
Gastrointestinal	24.5	17
Hepatobiliary	5.5	14.5
Pulmonary	21.5	14
Urogenital	18	16

A comparison was then made with the segregated diagnostic organs systems of both the physical exam diagnoses and the Balance 3.0 stressed organ profile to see if they were congruent in their conclusions. This comparison was made on the first 4 organ system

diagnoses, as further diagnoses were judged not to be clinically significant. A tabulation of the similar organ system findings – 4 out of 4, 3/4, 2/4, 1/4 and 0/4 congruence, taking the physical exam as the standard - Table 4.

Table 4. Congruence of Organ System Diagnoses

Organ System Diagnostic Congruency	4/4 100%	3/4 75%	2/4 50%	1/4 25%	0/4 0%
Numbers of Patients	30	75	69	22	4
% Agreement of Organ System Diagnosis	15%	37.5%	34.5%	11%	2%

Interpretation

The aim of this pilot study was to assess the feasibility of using a remote frequency-based GSR bio-survey to screen individuals in rural communities seeking medical assessment.

The results would have to satisfy a number of criteria for the instrument to be worthy of further consideration, namely: it should be inexpensive, simple to operate and speedy in its analysis. The output should be easy to understand yet offer enough raw data to investigate deeper into the output if additional information was needed. The output should be intelligible to both Western and TCM physicians, and offer treatment solutions that are both available locally and acceptable to the involved subjects. Lastly, the output should have a close global correlation with a standard physical exam, laboratory testing and investigative medical procedures.

The Zyto Corp balance 3.0 appears to meet all of these requirements, with some differences in measurement approach, and hence output. The methods of expressing disease and diagnosis are different, in that the most stressed organs are decided by the patient's energetic response and do not rely on the interpretation of, or examination of observed medical data by a third person. The Balance 3.0 is also more sensitive to functional organ problems than to diagnoses based on static abnormal laboratory values and anatomical changes revealed on imaging studies. This is seen in Table 3, where the percentage of patients with gastrointestinal stress is 24.5% on the Balance 3.0, and 17% as a diagnosis on the physical exam. The same holds true on the pulmonary system, with the Balance 3.0 showing 21.5% of patients lungs stressed, and the physical exam and pulmonary function tests showing only 14% of patients with this diagnosis. The physical exam is notoriously inefficient at diagnosing gastrointestinal issues of an inflammatory, immune or dysfunctional nature, and these are best diagnosed as a TCM pattern of disharmony between Liver, Spleen, Stomach and Intestines.[26] The pulmonary issue is probably related to subtle functional inflammatory changes in the lung, due to air pollution or smoking, which is not showing up yet as a change in the Pulmonary Function Test or radiographic imaging. This impression is bolstered by the high incidence

of chronic pharyngitis (33%) and conjunctivitis (22%) documented in the physical exam, also most probably as a result of chronic exposure to environmental pollution.[27]
On the opposite side, the Balance 3.0 showed only 16.5% versus 22% patients with endocrine problems, and 5.5% versus 14% with hepatobiliary problems. The endocrine system discrepancy is explained by this being diagnosed on glucose intolerance, a raised fasting blood sugar or HbA1c, while the pancreas or peripheral tissues may not show any functional stress at the time. The higher incidence of the hepatobiliary system on the physical exam is correlated with the high incidence of hepatitis B serology on lab testing without associated liver inflammation.

The available TCM Five Element graphical report is extremely useful, both from an analytical and therapeutic point of view. This report enables TCM practitioners to interpret the output from their medical system point of view and advise further assessment or to prescribe remotely if necessary.

A comparison of the dysfunctional organ systems seen in Table 4 shows a significant correlation of the Balance 3.0 assessment with the physical exam. There is full agreement in organ system involvement in 15% of patients (4 out of 4); 3 out of 4 systems in 37.5% of patients, 2 out of 4 systems in 34.5%; 1 out of 4 in 11% of patients and 0 out of 4 in 2% of patients. This correlates with an 87.5% concurrence in organ diagnoses in half the patients and a 75% concurrence in organ system association in 87% of the patients. Only 13% of patients show a correlation less than would happen by chance association – see Graph 1.

Graph 1. Organ System Correlations
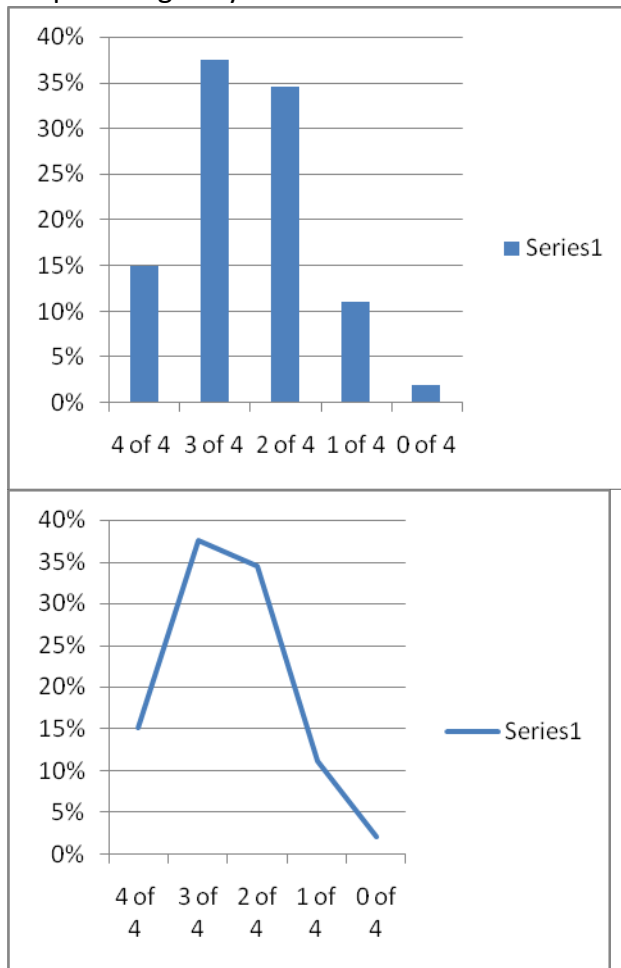
The results of this pilot study suggest that remote health measurement and triage can be guided, and in some instances, replaced by frequency-based GSR bio-survey technology. Further testing and interpretation needs to be accomplished, before this system can employed for further testing in the rural areas of China.

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