

TITLE: ***Marshall University Human Performance Laboratory Programs  
Research Shows Effectiveness of Therapeutic Lifestyle Intervention  
In Managing Cardiopulmonary Disorders and Diabetes***

TOPIC AREA: Health Education

PRESENTATION

FORMAT: Paper Session

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The objectives of this presentation were to:

- Illustrate therapeutic lifestyle intervention (TLI) effectiveness with chronic disease;
- Illustrate the importance of screening patients prior to their TLI program;
- Review TLI clinical impact with cardiac, pulmonary, & diabetes mellitus patients;
- Illustrate the impact of TLI intervention on patient use of the health care system;
- Illustrate the impact of TLI on the economic domain.

## **Introduction**

Our research over the past 20 years has provided convincing evidence of therapeutic lifestyle intervention [TLI] strategy effectiveness, in the context of patient medical care, for managing cardiac, pulmonary, and diabetes patients. A regimen of supervised exercise, sensible nutrition, smoke cessation, stress management, and self-management education influences patients in other ways: for example, they begin taking their medications on time and in the right dosages; diabetes patients check their blood glucose on a more regular basis and keep better records of their care. A primary aim of our self-management education program is to empower each patient with information and skills that allow them to become better partners with their physicians during scheduled office visits.

## **Causes of Death**

The 10 leading causes of death in 2010 are shown in **Table 1**. Although heart disease mortality has exhibited a fairly steady decline since 1980, it is still the number one killer in America and the world. As the table shows, respiratory and cerebrovascular diseases, with diabetes mellitus, continue as ranking clinical challenges in America. Treatment of

these disorders, in the context of patient medical care, with TLI strategies is the primary focus of this paper.

**Table 1. The 10 leading causes of death in the United States, 2010.**

1. <b>Diseases of heart</b>	2. Malignant neoplasms
3. <b>Chronic lower respiratory diseases</b>	4. <b>Cerebrovascular diseases</b>
5. Accidents (unintentional injuries)	6. Alzheimer's disease
7. <b>Diabetes mellitus</b>	8. Nephritis, nephrotic syndromes
9. Influenza and pneumonia	10. Intentional self-harm (suicide)

**MMWR. National Vital Statistics Report. Volume 60, No. 4; 2012 (January 11).**

## **Methods**

Patients were enrolled in a multifactorial TLI. Interventions included supervised exercise, smoke cessation, nutritional counseling, and educational sessions. Guest speakers were physicians, nurses, exercise physiologists, podiatrists, registered dietitians, pharmacists, physical therapists, and other health professionals. Social events and fun wellness competition events were also scheduled to enhance group camaraderie. Patients were risk stratified with a profile that included their history, physical, exercise test, pulmonary function test, lipid profile, CBC, hemoglobin A<sub>1c</sub>, anthropometric measures, and risk factors. These clinical data were also collected on a quarterly basis.

## **The Importance of Screening**

Exercise, however, is not without risks and patients with cardiopulmonary disease and diabetes, should be screened carefully for existing macro- and microvascular complications prior to beginning an exercise program (1). A thorough medical history and physical examination, which focuses on signs and symptoms of diseases affecting the cardiovascular system, eyes, kidneys and nervous system, should be part of the pre-participation medical profile. A graded exercise test may prove useful for some patients. Absolute contraindications to exercise participation include severe hyperglycemia, ketosis, recent significant electrocardiographic changes, unstable angina pectoris, uncontrolled cardiac arrhythmias causing hemodynamic compromise, untreated high-risk proliferative retinopathy and retinal hemorrhage.

Comorbid conditions, such as hypertension, dyslipidemia, retinopathy, renal disorders, peripheral and autonomic neuropathy, previous myocardial infarction (MI) and a history of revascularization procedures, are commonly observed in patients with type 2 diabetes. It is also not uncommon for these patients to have occult ischemic heart disease relative to cardiac autonomic neuropathy (CAN) and silent myocardial ischemia.

They may be asymptomatic, even during a conventional multi-stage exercise test (MSET), in the presence of significant ischemia observed on the electrocardiogram (ECG). Not surprisingly, sudden death has been associated with CAN in such patients. A patient screened prior to entering the Diabetes Exercise Center Program at Marshall University provides an example. **Table 2** below illustrates findings from his MSET that unmasked CAN and the need for urgent follow-up, in this case, coronary artery bypass

surgery [CABGS] within a week. The CABGS was successful and the patient was subsequently enrolled in the Cardiac Rehabilitation Program (CRP).

**Table 2.**

MSET Screening Case Example: A 65 year-old male with type 2 diabetes & PVD		
Resting BP:	148/82	Peak BP: 204/96
Resting HR:	62	Peak HR: 127
Post BP:	180/88	%APHR: 82%
RPP:	25,908	Post HR: 82
LVEF:	<CABG = .33	Post CABG = .55
Protocol	Bruce	7 METs
MSET Stopping Codes:	Sig. contour changes [4mm] across the precordium and silent ischemia; contraindication and referral	
Clinical Outcome:	Positive angiogram: CABGx5; referred for cardiac rehabilitation	

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## Results

Program participation and improved adherence of our patients with their medical regimen is repeatedly reflected in improved clinical profiles. **Table 3** shows lipid, fasting blood glucose (FBG), and hemoglobin A1c (HbA1c) changes with participation in a 12-week CRP by cardiac patients having comorbid diabetes mellitus (2, 3). Reduced symptoms in

**Table 3.**

CLINICAL DOMAIN II					
VARIABLE		Pre	Post	N	%**
HbA1c	[%]	7.9	6.8*	39	31
FBG	[mg/dl]	157	124*	26	31
<b>LIPID PROFILE</b>					
TSC	[mg/dl]	192	165*	62	39
LDL	[mg/dl]	111	92*	58	43
HDL	[mg/dl]	43	44	62	39
VLDL	[mg/dl]	33	25*	57	40
TRIG	[mg/dl]	248	153*	62	39
NONHDL	[mg/dl]	149	121*	62	39
TSC/HDL		4.9	4.0*	62	39
LDL/HDL		2.8	2.2*	57	40
		**Percent female.			
		*Significant 0.01 level.			

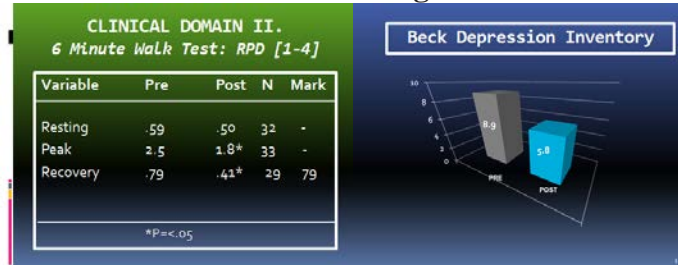
the form of chest pain, claudication, and dyspnea [Table 4] (4) are observed. Patients also report less depression [Figure 1] (5); these changes in clinical status improve the quality of their lives (QOL).

**Table 4.**

CLINICAL DOMAIN II.				
6 Minute Walk Test: RPD [1-4]				
Variable	Pre	Post	N	Mark
Resting	.59	.50	32	-
Peak	2.5	1.8*	33	-
Recovery	.79	.41*	29	79

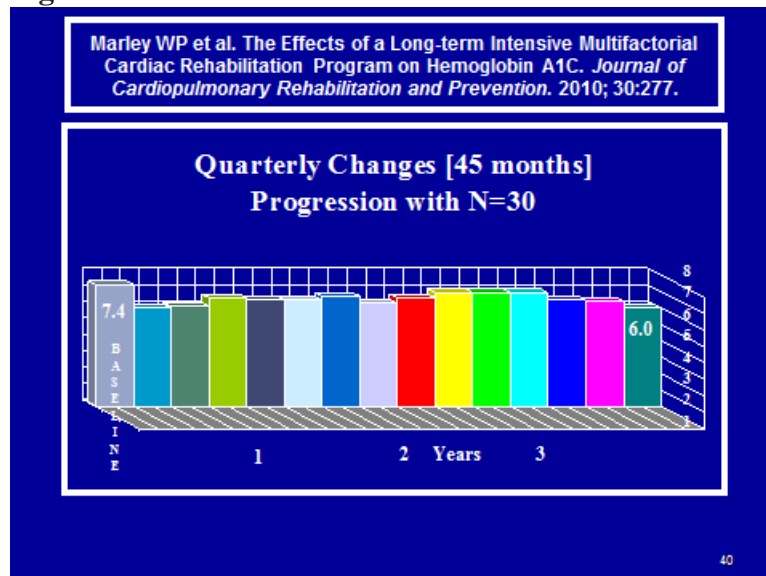
\*P<.05

**Figure 1.**



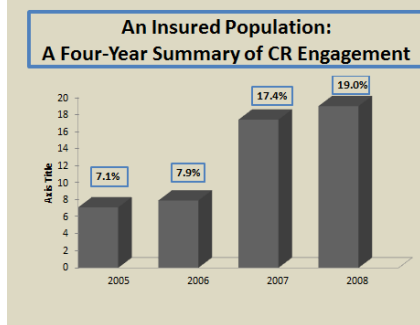
Our 4-year study (6) of program and medical regimen adherence confirmed the dedication of our diabetes patients in effectively controlling their blood glucose [Figure 2]. This will permit them to reap the long-term benefits shown in the medical literature for these patients: reduced disability in the form of blindness, lower extremity amputation, kidney disease with dialysis machine treatment, and reduced premature death and disability from cardiovascular disease.

**Figure 2.**

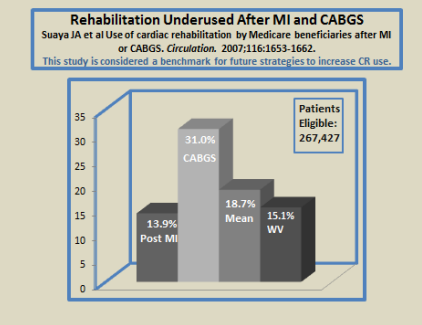


Current medical opinion considers cardiac rehabilitation (CR) to be a standard of care for cardiac patients that reduces their chances for premature death and disability. To check referral rates in the Tri State region of WV, OH, and KY in the United States, we conducted another 4-year study of 4,642 cardiac patients with a regional insurance carrier (7). Tri State referral rates were disappointing, less than 20% [Figure 3]. Although patient engagement increased in recent years compared with our earlier findings, from 7.1% in 2005 to 19.0% in 2008, the data were similar to previous findings by Dr. Jose Suaya, MD, (8) in his study of almost 300,000 Americans eligible for CR [Figure 4].

**Figure 3.**



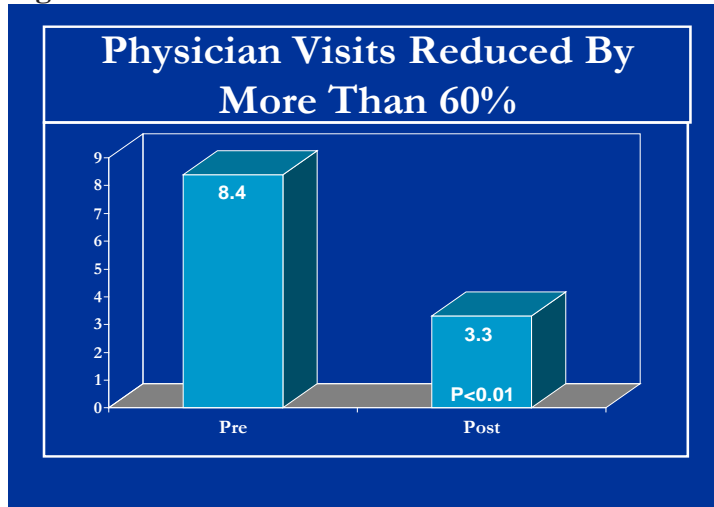
**Figure 4.**



I submit that significantly more effort is required to engage patients and their physicians. Patients should know about their option for enrolling in CR.

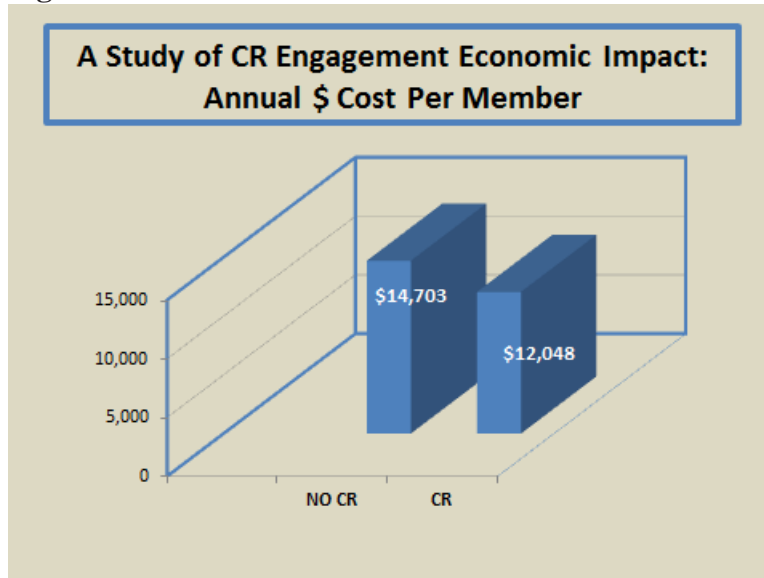
Our program interventions have also been accompanied by reduced patient dependence on the health care system. A 3-month study of 31 diabetes patients with heart disease (2, 3, 9) witnessed significant reductions in medications, emergency room visits, hospital admissions, and visits to physicians. The latter were reduced by more than 60%, giving physicians some breathing room with the diabetes epidemic in West Virginia and the Tri State Region (**Figure 5**).

**Figure 5.**



Program participation for both cardiac and pulmonary patients has also had a significant impact on the so-called bottom line. Our study of the insured population reported earlier (7) showed the average annual medical claims costs for CR nonusers and CR users to be \$14,703 and \$12,048, respectively, a savings of \$2,655 per patient [**Figure 6**].

**Figure 6.**



Our most recent publication (10), a study of 115 diabetes patients with comorbid cardiovascular disease, reports unique gender and age group data. These data reveal clinical trends and profiles that can prove helpful for clinicians in managing these patients.

What's the message? Following a heart attack, heart surgery, treatment for chest pain, or the presence of lung disease, patients should ask their physician about the possibility of being enrolled in a cardiac or pulmonary rehabilitation program. Those with diabetes may discuss participation in a lifestyle management program that includes supervised exercise and risk factor management strategies. The physician's referral is absolutely essential; they must confirm that it is in a patient's best interests to consider these options.

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