Introduction: A patient’s lack of comprehension and failure to follow discharge instructions can affect readmissions. The nurse’s role is to provide the patient with tools to increase his/her self-care and self-efficacy. The purpose of this study was two-fold: 1) to create a systematic education program to help patients identify modifiable risk factors for heart disease, and learn ways to reduce these; 2) to encourage patients to take ownership of their rehabilitation experience, by tracking their own progress. It was hypothesized that increasing participant knowledge of risk factors for heart disease would also increase their self-efficacy.

Purpose: This study was developed because the cardiac rehabilitation program had no structured education component; and no method to measure retention of the education that was given to patients. The patient population was cardiac rehabilitation participants in Midland, TX.

Design: The education program was designed to be cost effective and not time intensive. Four simple tools were created to be used together to increase patient knowledge on modifiable risk factors for heart disease. The four tools include: 1) a quiz; 2) posters designed by staff; 3) small educational signs attached to exercise equipment; 4) “scorecards” that are completed by participants at each cardiac rehabilitation session. Posters were created using tri-fold presentation boards. The quiz is administered on paper upon admission before any education is provided, and again upon completion of the program. Colorful equipment signs were printed, laminated, and attached with Velcro to each piece of exercise equipment. “Scorecards” are printed on brightly colored cardstock. The modifiable risk factors for heart disease were divided into six groups, which provided two weeks per topic for this twelve week program. “Scorecards” are completed by participants, who must locate answers to education questions on posters and/or exercise equipment signs. Participants are also required to track their exercise on each piece of equipment. The “scorecards” are checked by staff for completeness and correctness, with remediation provided at that time as needed.

Results: One year of pre and post quiz scores were analyzed. Average pre quiz score was 46.8% and average post quiz score was 91.9%. This was shown to be a statistically significant increase (p=0.0001). Patient knowledge of modifiable risk factors for heart disease increased due to the education initiative developed.

Conclusions: The tools are simple and may be transferrable to other cardiac rehabilitation programs. The tools and topics could also be modified to fit alternate rehab programs and disciplines.
Abstract ID: 2
Title: Does a Heart Failure Telemedicine System Help Remotely Detect Decompensations and Improve Patient-provider Communication? A Pilot Study
Authors: Patel, Kunjan¹; Javaherian, Kavon²; Sink, Eric¹; Groenendyk, Jacob²; Taake, Jill²; Ewald, Gregory, MD²
Institutions: 1. Saint Louis University School of Medicine, Saint Louis, Missouri, United States.
2. Washington University School of Medicine, Saint Louis, Missouri, United States.

Introduction: Heart failure is the most common source of hospital readmissions for individuals greater than sixty-five years of age with annual spending approaching $40 million. American hospitals face pressure to reduce HF-related readmissions.

Design: Our HF system was designed based on collaborative interviews with physicians, nurses, and patients at WUSM. The system prompts patients to report their body weight, blood pressure, and heart rate via text messages. Patients are also asked to report symptoms of dyspnea, orthopnea, edema, and paroxysmal nocturnal dyspnea. If the patient reports change beyond set thresholds or worsening of symptoms, the provider receives an alert encouraging patient follow up to address the decompensation and remotely alter the plan of care. Ten adult patients participated in the pilot study and were followed for 14 weeks at the WU HF clinic. Patient response rate, number of alerts, and number of patients receiving interventions were recorded. After iterative changes based on the initial cohort, a 400-person randomized-controlled trial is underway in February 2016 to assess the impact of the system on hospitalizations, morbidity, and patient compliance.

Results: Preliminary results show a 79.8% patient response rate over a 600-message span. On average, each patient in the pilot study generated eight alerts to the system. 5 patients received interventions that led to medication titration and prevention of hospital admission. The system’s economic sustainability was demonstrated by performing a cost-benefit analysis using Chronic Care Management billing codes.

Conclusions: Our system leverages widely adopted SMS messages to remotely provide clinically relevant information and improve patient-provider communication. The intervention also helps detect decompensations as evidenced by multiple interventions in the plan of care for half the enrolled patients, representing a novel way to care for and follow-up with patients.

Implications: The HF system contributes to a change in practice by providing a novel, cost-effective way to monitor patients that assists with today’s push towards improved chronic care management.
Abstract ID: 3
Title: Culinary Literacy and Experiential Nutrition Education in Cardiac Rehabilitation: A Pilot Program
Authors: La Londe, Michelle, MA1; Monfiletto, Emily, RD, LD1; Sprang, Sherri, MSN, RN, NE-BC1; Shaffer, Lynn, PhD1.
Institution: 1. OhioHealth Cardiac Rehab, Columbus, Ohio, United States.

Introduction: Cardiac rehabilitation (CR) nutrition education is didactic in nature. Didactic methods may not transfer knowledge to all adult learners or build sufficient skills to enable the translation of information into action.

Purpose: To assess the culinary literacy of our CR patients and explore the effect of adding an experiential element to CR nutrition curriculum.

Significance: The American Heart Association developed the “Life’s Simple 7” which targets 7 key health factors/behaviors that can increase the risk of heart disease and stroke. Of the seven, five are affected by diet. Nutrition education has yet to evolve, despite strong evidence that the incidence of heart disease can be influenced by lifestyle changes.

Design: The ‘Healthy Bites’ program was implemented in July 2015. It consists of serving healthy recipe samples with recipe cards every other week during CR nutrition education classes.

Methods: Patients were asked to complete a 2 item questionnaire rating the taste of the sample and the likelihood of making the recipe at home. To assess culinary literacy, a questionnaire was administered to patients attending nutrition education.

Results: From July 2015 through February 2016, 560 heart healthy samples of 15 different recipes were served to CR patients. Patients rated the samples 3.9 out of 5 stars for taste. An average of 80.7% of patients liked the recipes; however, 36.1% responded that they would not make it at home despite liking the recipe. An average of 18.4% of patients were neutral or disliked the samples.

Culinary literacy assessments were performed on 4 separate occasions collecting data on 78 unique patients. 15.4% of patients report using convenience foods ≥ 5 days per week. 47% report cooking from basic ingredients ≥ 5 days per week. 72.5% of patients cited lack of time as the biggest barrier to cooking. 64.1% report a high level of confidence when preparing foods from basic ingredients. The majority of patients (80.8%) report being willing to try new foods, but only 58.8% report a high level of confidence with food preparation using new foods/recipes.

Conclusions: The ‘Healthy Bites’ program was a successful first step into experiential nutritional education. The culinary literacy assessment provided good information for planning our next steps in experiential nutrition education.

Implications: Future efforts in experiential nutrition education must include hands-on opportunities stressing quick and easy food preparation techniques. In addition, further refinement of assessment tools is needed to ensure accurate assessment of our patient’s needs and program outcomes.
Introduction: With increased numbers of pediatric patients attending cardiac rehabilitation (CR), our staff realized that traditional CR programing does not meet the needs of this growing population resulting in significantly reduced attendance.

Purpose: To describe the methodology of programmatic changes necessary to meet the needs of pediatric CR patients in an effort to improve attendance.

Significance: Traditional CR programs are designed for adults and include assessments, exercise guidelines, equipment, and education which are less applicable to the pediatric population. Our cardiac rehabilitation staff acknowledged this gap and made practice modifications to accommodate these patients.

Design: Practice Improvement Project.

Methods: Beginning June 2015, our CR program implemented a new approach to pediatric care. With the understanding that young patients will have shorter attention spans resulting in an inability to accomplish traditional program activities (e.g. 30 minutes on exercise equipment), we modified our program to include multiple "stations" with varying activities. We found that pediatric patients tended to exert higher intensities if the activities were limited to 10-15 minutes versus 30-45 minutes (continuous). In this model, staff transitioned pediatric patients between 2-3 different modalities to accumulate the full 30-45 minutes of exercise. Additional insights from this modified program suggested not all pediatric patients were interested in traditional CR equipment either due to body size or perceived fear of the equipment. As a result, more non-traditional strategies were employed to engage these patients in exercise including playing tag, soccer style drills, playing games on the Wii, and other age appropriate "games" to achieve proper exercise intensities and duration. Finally, we also addressed strength training. To accomplish this, the staff led exercises using resistance bands which mimicked activities the pediatric patient enjoyed. One example was creating a "play bow" for a patient who wanted to return to bow hunting. The staff member made a bow out of a plastic stick and a resistance band to be able to complete single arm rows, mimicking the action of a bow hunter.

Results: Seven pediatric post heart transplant patients participated in cardiac rehabilitation between September 2013 and October 2015. Three of those patients participated in the new approaches to exercise and participated on average 7 additional sessions.

Conclusion: By modifying the pediatric cardiac patients’ exercise program to meet their needs, these patients were more engaged in the cardiac rehabilitation program.

Implication: Our program is considering designing a specific Pediatric Cardiac Rehabilitation Program to ensure all patients’ needs are met, regardless of age.
Abstract ID: 5
Title: Comparison of a derived ecg from a cardioware harness to a standard 12-lead ECG at rest and exercise
Authors: Kosan, Nickie\textsuperscript{1}.
Institution: 1. Cleveland State University, Cleveland, Ohio, United States.

Introduction: ECGs are a fundamental tool of clinical practice and are one of the most common diagnostic cardiovascular tests conducted to detect cardiovascular disease.

Purpose: To determine whether a 12-lead electrocardiogram (ECG) using five dry electrodes in the modified EASI electrode position in the CardioWare harness can be derived from a standard 12-lead ECG during rest, ambulatory walking, and strenuous walking on a treadmill.

Significance: The CardioWare harness needs to be investigated because there is a need to improve patient compliance, and to reduce the associated costs of advanced monitoring and diagnostic capability in telemetry settings.

Design: Thirty healthy men (n=15) and women (n=15), ages 20-54 years, from Cleveland State University participated in this experimental research study.

Methods: Subjects served as their own controls, as they were connected to both types of ECG simultaneously (Modified EASI CardioWare and Standard Mason-Likar). Data were collected from both ECG placements for five minutes of rest (Trial A) and during Trial B for two intensities of exercise. The first half of Trial B included rest and ambulatory walking (Stage 1: standing rest and Stage 2: walking 1.7mph, 0% incline). The second half of Trial B consisted of strenuous walking and recovery (Stage 3: walking 1.7mph, 10% incline, Stage 4: walking 2.5mph, 12% incline, and Stage 5: standing recovery). All stages were three minutes in length. Paired samples t-tests were used to compare the two electrode placements.

Results: There was no significant difference between the root mean square error (RMSE) of the two different types of electrode placements during either the first half or the second half of Trial B (p ≥ .05). All correlations of RMSE between the first half and second half of Trial B were robust (r range= 0.658 - 0.942) and significant (p =0.0001). The subjective goodness of fit measure based on the overlay of both types of ECGs was similar.

Conclusions: It can be concluded that the modified EASI derived 12-lead ECG is an acceptable alternative to the standard 12-lead ML system at rest, ambulatory, and strenuous walking.

Implications: When applied to the hospital setting, the CardioWare harness would be less likely to interfere with other clinical procedures, record less movement artifact, and increase patient comfort.
Abstract ID: 6
Title: Improvements in Cardiac Self-Efficacy in Response to Cardiac Rehabilitation in a Veterans Affairs Hospital System
Authors: Smith, Rebecca, PT, MS, GCS¹; Allsup, Kelly²; Althouse, Andrew¹; Tarolli, Karen¹; Bello, Nicholas¹; Byard, Thomas³; Reeger, Jennifer¹; Coughenour, Derek¹; Hickey, Gavin¹; Lemieux, Nicole¹; Forman, Daniel E., MD².

Introduction: Goals for patients participating in cardiac rehabilitation (CR) include exercise conditioning, risk factor and behavior modification education. Standard outcomes include increased physical function, decreased symptoms and improved cardiac health.

Purpose: We sought to quantify improvements in cardiac self-efficacy (CSE) among patients that have completed the VA Pittsburgh (VAPHS) CR program.

Significance: Changes in self-confidence derived from CR is a key benefit with residual impact on long-term self-management and prognosis. By empowering the patients with this knowledge and ability, outcomes are likely to improve.

Design: In a quality improvement project we evaluated patients before and after CR program. Admitting diagnoses included ischemic heart disease, coronary artery bypass surgery, valvular heart disease, and heart failure. Patients in both the home-based and hospital-based arms of the CR program were included. Home-based CR included home-based exercise with weekly education and phone calls. Hospital-based included onsite exercise 1-3 days a week with education.

Methods: Patients completed the 13 item CSE at initial evaluation and discharge. Pre- and post-treatment scores were compared. CSE is a questionnaire which quantifies the knowledge and confidence patients have in regard to their heart condition. It assesses 2 key factors; controlling symptoms and maintaining function.

Results: To date, 16 patients (mean age 66±9, range 44-87) have completed the CR program. They have reported significant improvement in self-efficacy for controlling symptoms (POST: 26.5 vs. PRE: 23.0, p=0.02), maintaining function (POST: 15.5 vs. PRE 9.0, p<0.001) and overall (POST: 42.0 vs. PRE: 32.0, p<0.001). At the conclusion of the program, 14 patients (87.5%) reported feeling “very” or “completely” confident in their ability to get regular aerobic exercise vs. 5 (31.3%) before the program (p<0.001).

Conclusions: Patients who completed the CR rehab program at VAPHS showed a significant improvement in their CSE score with particular benefit in relation to maintaining function and exercise.

Implications: Patients who participated in CR achieved substantial improvements in self-efficacy, including those who were very old. Their confidence was substantially improve, which suggests there is increased related potential to engage in their lives without anxiety or fear. These are critical benefits that have been largely overlooked and which may factor critically in adherence to physical activity, reduced readmission, improved quality of life, and other clinical effects.
Abstract ID: 7  
Title: Connected Health Exercise Consultations in a Heart Failure Telemanagement Program  
Authors: Scales, Robert, PhD, FAACVPR; Lew, K.; Parker, C.; Buman, M.; Akalan, C.; Vucicevic, D.; Steidley, E.; Raad, A.; Lester, S.  

Introduction: Medically-directed exercise is a recognized therapy for optimal heart failure (HF) management.

Purpose: This pilot study evaluated the process of delivering brief connected health (CH) exercise consultations to a group of HF patients who elected to participate in a cardiology-based telemanagement program.

Design: Thirty patients were enrolled to receive medically-directed CH consultations from an interdisciplinary healthcare team over a 4-month period. Methods: Portable Bluetooth technology with Wi-Fi connectivity was used to remotely monitor health parameters in the home (weight, blood pressure, oxygen saturation, heart rate, steps/day). Pre and post exercise participation was evaluated with the Physical Activity Vital Sign (PAVS) and a 7-day recall. An exercise physiologist (EP) provided telephone HF exercise therapy education plus guidance with exercise prescription and short-term progressive goal setting. Patients received the option to enroll in supervised cardiac rehabilitation (SCR) close to home when feasible.

Results: Twenty-five patients (mean age=64.2 years, SD=13.4; 76% male) completed pre and post testing and participated in the exercise intervention. The mean ejection fraction was 31% (SD=15.7), 64% (n=16) had an ICD/pacemaker and 36% (n=9) were classified with a NYHA Functional Class III-IV. The total telephone exercise consultation time/patient was 83.0 (SD=26.4) minutes with a mean of 5.8 (SD=1.3) calls/patient over the 4-month period. The mean telephone call time was 14.3 minutes. The PAVS current (past week) number of days/week with 30+ minutes of accumulated continuous exercise significantly changed from a mean score of 1.1 (SD=1.8) day/week to 3.4 (SD=2.5) days/week (p<0.005). The PAVS typical (past 3-months) number of days/week significantly changed from 1.1 (SD=1.7) day/week to 2.7 (SD=2.2) days/week (p<0.005). Exercise participation quantified with the 7-day recall changed from 4.3 (SD=5.1) to 9.0 (SD=12.1) MET-hours/week (p<0.005). The mean time invested to structured continuous exercise changed from 1.3 (SD=1.6) hours/week to 2.5 (SD=3.4) hours/week (p>0.005). Pre and post SCR enrollment changed from 8% (n=2) to 36% (n=9). Conclusion: In this self-selected population, it was feasible for an EP to conduct CH exercise consultations within a comprehensive HF telemanagement program.

Significance: CH may provide a process to deliver cardiac rehabilitation support away from the clinic.
Abstract ID: 8
Title: Rochester Coronary Club and Local CR Staff: A QI Project
Authors: Leth, Shawn, MEd1; Hovey, Amanda, BS2.
Institutions: 1. Mayo Clinic, Rochester, Minnesota, United States. 2. Olmsted Medical Center, Rochester, Minnesota, United States.

Introduction: A quality improvement initiative was established between the Rochester Coronary Club (RCC) and Olmsted County, MN, Cardiac Rehabilitation (CR) staff to promote and expand RCC’s scope and sustainability.

Purpose: The RCC Board of Directors identified the need for a succession plan in order for the club to continue providing community outreach in Olmsted County and beyond, while adhering to the 501(3b) government guidelines. The inclusion of Olmsted County CR staff was a vital component for addressing relevant physical and psychosocial aspects of heart disease in an organized and collaborative fashion.

Significance: The RCC is the only local organization offering group-based psychosocial support specific to heart disease. For sustainability, the RCC wanted to form and maintain an appropriately-scoped, ongoing connection between themselves and Olmsted Medical Center (OMC), Mayo Clinic (MC), and other community groups. The RCC also wanted to broaden its scope to reach more people in Southeastern Minnesota.

Design: A comprehensive group, consisting of the Board of Directors, CR staff from OMC and MC, an operations coordinator, and a nurse advisor, met monthly to define the succession plan and establish adherence to the 501(3b) government guidelines. They worked collaboratively to determine the succession plan and future goals for RCC.

Methods: The design group identified a systematic way to invite speakers to the monthly community meetings. They retained the assistance of an administrative assistant as well as a certified public accountant. Identified goals were: reinvigoration of board, increase membership and attendance, meeting logistics, established descriptions of board positions, communication tools for marketing, and other miscellaneous items. A participant satisfaction survey was administered.

Results: The group created a mission statement and logo, and established a club email, post office box, and electronic documents. They defined board descriptions and held elections to fill the vacancies. Survey results indicated 97% desired improvement of audiovisual equipment, 72% parking availability, and a change in meeting location. Comments included having a RCC email and suggested speaker topics.

Conclusions: Reinvigoration and establishment of the board positions, including CR liaisons, resulted in improved member satisfaction and engagement. The use of a shared web based environment also increased member and board communication.

Implications: This project has promoted collaboration between local CR programs, has allowed the RCC to be truly community based, and has supported outcome value in participation in post-cardiac care groups for normalization, networking and a source of continuing education on heart-related topics.
Abstract ID: 9
Title: Home-Based Cardiac Rehabilitation: Improving the delivery of Cardiac Rehabilitation at a VA Medical Center
Authors: Rohrbach, Greg, NP1; Bettencourt, Michael, EP2; Rush, Kimberly, RN, BSN3; Schopfer, David, MD, MAS4; Whooley, Mary, MD1
Institutions: 1. San Francisco Veteran’s Administration Hospital, San Francisco, California, United States. 2. Veteran’s Administration Medical Center, Rohnert Park, California, United States. 3. San Francisco Veteran’s Administration Medical Center, Daly City, California, United States. 4. San Francisco Veteran’s Administration Hospital, Oakland, California, United States.

Introduction: Despite overwhelming evidence and widespread endorsement, service utilization, uptake and patient adherence to cardiac rehabilitation (CR) programs remain suboptimal.

Purpose: Evidence-based home CR programs, including the use of telephone follow-up sessions, have demonstrated effectiveness in reducing modifiable cardiac risk factors, increasing quality of life and reducing hospital readmission rates. A telephone-based CR program has the potential of optimizing enrollment with improved access, within a VA region ranked lowest in CR participation nationwide.

Significance: The treatment gap of CR is echoed throughout the Veteran’s Administration (VA) Health Care System. A survey of VA cardiovascular specialty care services found that only 28% of the 124 VA medical centers offer a supervised, facility-based CR program. Currently, no VA facility-based CR programs exist in VISN 21, the Northern California region for VA cardiac specialty care.

Design: The Healthy Heart Program at the San Francisco VA Medical Center is a physician-directed, nurse case-managed, multidisciplinary team approach that provides a customized exercise and lifestyle telephone-based program. The core components of this program include: exercise testing and education, nutrition and weight management, blood pressure, lipid and diabetes management, medication adherence, smoking cessation, psychosocial support and outcome assessment. Patients enrolled into the 12-week phase II program are given home exercise equipment and a workbook that includes educational guidance and dietary/exercise logbooks.

Method: 877 veterans (aged 37-91 years) with heart disease have been referred to the Healthy Heart Program between April 2013 and May 2016.

Results: 361 veterans have enrolled into the Healthy Heart Program, of which 204 participants have completed the 12-week phase II program. 75 Veterans have been referred to non-VA facility-based CR programs. Since its inception, the Healthy Heart Program has dramatically increased the proportion of eligible Veterans participating in cardiac rehabilitation, from <2% in fiscal year 2011 to 48% in fiscal year 2015.

Conclusions: Home-based CR, utilizing a multidisciplinary team approach and telephone follow-up sessions, significantly increased the number of eligible veterans enrolled into CR at the San Francisco VA medical center.

Implications: The future of CR will include alternative models of care delivery that includes a home-based component. Home-based CR will help to increase the number of participants who participate by expanding the reach of cardiac risk factor management programs beyond the setting of the traditional, supervised structured setting. A home-based program will be a valuable addition to facility-based programs, as a stand-alone program or adopted into a hybrid program.
Abstract ID: 10  
Title: COPD Focus Study: Improving Education and Reducing Readmission  
Authors: Schwier, Sarah, RRT¹; Triantafilou, Miranda, RRT, BSRT¹.  
Institution: 1. The Christ Hospital, Cincinnati, Ohio, United States.

Introduction: The Christ Hospital developed a phase one pulmonary rehabilitation program that focuses on inpatient education of COPD patients to reduce 30 day readmission at our hospital.

Purpose: The aim of this study is to implement an inpatient COPD education program and to track COPD related readmission rates to reduce 30 day COPD readmission at The Christ Hospital.

Significance: With hospitals being penalized for chronic obstructive pulmonary disease (COPD) readmission, more focus is being placed on COPD readmission rates.

Design: A multidisciplinary focus group called, COPD FOCUS STUDY, was formed. The participants tracked COPD admissions, readmissions, and education every 30 days from 2015 to 2016. A COPD Education program was initiated, and respiratory therapists educated every patient with a physician prescribed COPD Education order set. The education was performed at the patient’s bedside at The Christ Hospital of Cincinnati, Ohio.

Methods: The COPD FOCUS STUDY conducted monthly meetings for the first year, and then met when needed. The COPD Education Program founder developed a flipbook to help provide education at the bedside, COPD brochures were made for patient review, and a COPD Action plan was constructed and utilized. Monthly reports were sent to the COPD FOCUS STUDY members to review COPD readmissions within the 30 day period.

Results: In 2015, The Christ Hospital had a 15.40% COPD readmission rate after a full year of the implemented COPD Education Program. The Christ Hospital currently has a 15.27% COPD readmission rate for 2016. There was a 0.13% decrease in COPD readmission rates from 2015 to 2016 year-to-date. The COPD Education order set was utilized 619 times in 2015. Many readmissions were generated by the same patients. Referrals were sent to patient selected facilities.

Conclusions: The Christ Hospital is continuing to improve this program, and it is in the process of creating an Asthma Education Program and order set. There was a 0.13% decrease in COPD readmissions, and we are striving to reduce readmissions more this year. There is still room for improvement in the reduction of readmissions.

Implications: This project reinforced the notion and raised awareness of the need for inpatient education. The COPD FOCUS STUDY found that follow-up was needed post discharge in order to improve patient compliance with pulmonary function testing, medication, and physician visits. We are currently questioning what other lung diseases should be added to this program.
Abstract ID: 11
Title: Cardiovascular Risk Assessment and Management: A Unique Program
Authors: Traynor, Kathleen, RN, MS, FAACVPR; Sanborn, Tinamarie, RN, BSN; Guo, Xiao; LaMorte, Clare, RN, MPH; Natarajan, Pradeep, MD; Kathiresan, Sekar, MD.
Institutions: 1. Massachusetts General Hospital Cardiac Rehabilitation Program, Boston, Massachusetts, United States. 2. Boston Medical Center, Boston, Massachusetts, United States.

Introduction: As part of Healthy People 2020, the American Heart Association defined 7 ideal metrics, comprised of health factors (blood pressure [BP], LDL cholesterol and fasting blood glucose) and behaviors (smoking, physical activity, healthy eating and body mass index [BMI]). Less than 1% of Americans meet all 7 metrics. Between 1999-2002, those who met 5 of 7 metrics had 78% reduction in all-cause mortality (Ford ES et. al., 2012). These metrics influence chronic disease processes in the circulatory system and brain.

Purpose: Increase the proportion of patients with ideal health behaviors and factors. Systematically gather health factor and behavior information, via a risk factor assessment tool with patients seen in the ambulatory Heart Center and Vascular Center clinics, at Massachusetts General Hospital. Provide a targeted intervention to those identified as high risk [Current smokers or quit <30 days ago; known ASCVD and reports not taking aspirin or statin therapy]. Make available a personalized report with scores and educational information to facilitate lifestyle changes. Promote wellness through a 6-month pilot lifestyle management program, to improve physical activity and healthy eating.

Method/design: Assemble a multidisciplinary team for planning and risk assessment survey development. Create clinic workflow and provide training/reference materials to staff involved. Survey collection is ongoing in Cardiology, Vascular Surgery and the Vascular Center. Identify and provide smoking cessation and medication reconciliations for high risk patients. Conduct a 6-month lifestyle management pilot utilizing an interactive web application, activity trackers, Global Mood Scale [GMS] pre and post, weekly nurse coach phone calls for 3-months, weekly educational texts (SMS) and weekly nutrition surveys.

Results: Over 5700 MGH Health Check assessments were completed; personalized reports were provided to patients. 6% of patients reported optimal lifestyle related behaviors. 355 high risk patients received intervention. Data from lifestyle management pilot were analyzed using paired T-Tests and demonstrated statistically significant decrease in BMI (p < .05), percentage of body fat (p < .05), waist circumference (p < .05), systolic BP (p < .05), and negative affect scores on the GMS (p < .05).

Conclusions: Risk factor management by clinical staff is important to improve outcomes, cut costs and is easy to manage with innovative technology. Broader availability and use of our tool and other novel approaches across MGH would be beneficial to reduce cardiovascular risk in our patient population. Cardiac Rehabilitation Programs are well positioned to creatively expand services and lead these innovative risk factor assessment efforts.
Abstract ID: 12
Title: Protocol for a Global Survey of Cardiac Rehabilitation Programs: Comparing Availability and Delivery Around the World
Authors: Supervia Pola, Marta, MD, MSca; Lopez Jimenez, Francisco, MD, MSca; Turk-Adawi, Karam, PhD; Bjarnason-Wehrens, Birna; Thomas, Randal, MD; Grace, Sherry L., PhD.
Institutions: 1. Mayo Clinic, Rochester, Minnesota, United States. 2. Faculty of Health, York University, Toronto, Canada. 3. Institute for Cardiology and Sports Medicine, German Sport University, Cologne, Germany. 4. Cardiorespiratory Fitness Team, Toronto Rehabilitation Institute, University Health Network, Toronto, Canada.

Introduction: Cardiac rehabilitation (CR) is an essential part of the continuum of care for patients with cardiovascular disease, given the well-established benefits of participation. CR provision at the national level is somewhat understood in several high-income countries in Europe, as well as in North America. Standards for CR delivery have also been established in these countries. There have also been comprehensive surveys administered regarding CR delivery in Latin America, China and the Arab world. Results revealed major variability in funding models, program characteristics, availability and delivery of minimum standards. However, little is known about CR delivery in most countries of the globe.

Purpose: To: (1) assess CR program characteristics, (2) identify barriers to CR delivery, and (3) estimate the density of CR programs by number of inhabitants in each country around the world.

Design: Quantitative, observational and cross-sectional study.

Methods: An anonymous, online survey of CR programs all over the world identified through member lists of participating national CR societies, a Google search, as well as investigators’ contacts, will be undertaken. A maximum of 50 CR programs per country will be randomly selected (where ≥50 centers are identified) and will be emailed an invitation to participate. Non-respondents will be sent 3 follow-up email reminders at 2 week intervals. The survey has been developed based on previous national CR surveys. Items are designed to assess: (1) location of the program in the healthcare system; (2) how CR is funded/reimbursed; (3) program capacity and costs; (4) healthcare professionals on the CR team; (5) components delivered; (6) nature of patients served; (7) alternative models delivered; and (8) barriers to delivery. The survey was piloted in Canada and in countries where Arab is the official language. Then some further revisions were made.

Descriptive statistics will be computed for all closed-ended items in the survey. All open-ended responses will be coded. Responses will be compared by country and by economy (defined by the World Bank), through ANOVA or chi-square as applicable. Post-hoc tests will be performed. To test the third objective, the ratio of CR programs to the national population will be computed.

Anticipated Results/Conclusions: By administering a common survey internationally, the global CR community will have better understanding of CR. This information will be useful for health policy-makers, health services researchers and international organizations willing to promote the availability and quality of CR around the world.
Abstract ID: 13
Title: Utilization of Integrated Mental Health Services by Cardiac Rehabilitation Patients
Authors: Shah, Avani1; Anderson, Kim1; Templeton, Stacey1; Ingram, Lee1; Simpson, Kersey1; Meadows, Jim1.

Introduction: Although psychological complaints, such as stress and depression, are common and predict adherence to Cardiac Rehabilitation (CR), few studies have examined the co-location of mental health services in CR settings and how many patients would utilize mental health services if available on-site.

Purpose: The purpose of this study is to determine utilization of mental health services when offered in a CR setting. This information is likely to inform other CR facilities about the uptake of mental health services and the mechanisms by which to implement mental health services.

Design: This is a descriptive study. Sample: 385 CR patients at a southern private hospital were informed about the availability of mental health services within the CR clinic from March 2013 to October 2015.

Methods: Patients were informed about the presence of a mental health social worker on-site by a nurse practitioner conducting the patient intake interview. Individuals were referred to the social worker for services. The social worker recorded the referral issue and what services were provided.

Results: A sample of 63 CR patients were referred for services. After the initial intake interview with the social worker, 46% of the patients declined additional services and 63% received additional services. Of those who received more than one session of services n =40, 33% received cognitive behavioral therapy with motivational interviewing to address depression and stress as part of a clinical trial. Of the remaining individuals n = 27, 34% engaged in brief psychotherapy and 22% required referral for social services or case management.

Conclusions: Results suggest that a number of CR patients will utilize social work services to address psychological or social service needs. Implications: This on-site project aided in mental health referrals. During the study, social work staff were available 2 days a week allowing patients to complete their exercise session and subsequently their counseling session. Co-located mental health providers prepared staff for crisis intervention, addressing community resource needs, and dealing with mental health needs. We implemented new screening tools (PHQ-9, Rate your Plate, and Dartmouth COOP) used for National Registry data collection, improving our screening methods and the reliability of results for patient outcomes. The question this study has raised is: What are the benefits of having all Cardiac Rehabilitation staff formally trained in psychosocial assessment and wellness coaching versus the utilization of a social worker for ongoing assessments and planning?
Key words: on site mental health treatment
Abstract ID: 15
Title: The Use of Smart Phone Technology to Cost-Effectively Enhance Patient Outcomes in Phase 2 Cardiac Rehab
Authors: Ledyard, Jon, MS, RCEP, FABC; Forman, Dan, MD; Goodwin, Kevin, RN, BSN; Cipkala-Gaffin, Janet DrPH, PMHCNS-BC; Jordan, Mark, MS, CEP, CCRP; Palombo, Cindy, RN, BSN, MS; Hagmann, Julie, MS, MHA; Wallace, Amanda, MS; Collins, Victoria, RN; Manko, Terry, RN, MS; Alrawashdeh, Mohammed, BSN, MSN.
Institution: 1. University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, United States.

Introduction: This study runs for 6 months and captures outcomes for patient over the course of participation in Phase 2 cardiac rehabilitation. The measures for each patient are based on the starting date and length of time they participate.

Purpose: To improve clinical outcomes for patients participating in site-based cardiac rehabilitation by complementing the program with smart phone technology.

Significance: Cardiac rehabilitation is significantly underutilized. Alternatives to the traditional rehab model that improve accessibility and attendance need to be explored.

Design: It was conducted in an AACVPR Certified cardiac rehabilitation center. The application was downloaded to the patient’s smart phone. The patient was encouraged to use it during their participation in Phase 2.

Methods: 1. Staff downloaded the applications to qualifying patient’s phones and explained its use. 2. Patient voluntarily completed daily tasks and messaging. The extent to which the patient completed tasks was voluntary. 3. Staff, from a dashboard on their computer, used the application to send education material, messages and change the exercise prescription. They also get responses to brief surveys which help them better target patient’s goals. 4. The data collected includes age, sex, race, marital status, diagnosis, changes in functional capacity, systolic blood pressure, and body weight. Smoking cessation, quality of life, self-care and technology survey, patient satisfaction, and depression were also tracked.

Results: Early data are showing a weekly engagement rate of 77%. We have 6 clinicians sharing the task of providing care to 35 patients. The average age was 55, male, female, Caucasian and Black. The remaining results will be available by the September AACVPR conference.

Conclusions: We established that this type of tool will be used, staff and patients are satisfied and that it does not worsen the clinical outcomes of on-site programs. Patients are receiving more education, medication reminders and communication between staff and patients has improved. We will continue to use and collect outcomes.

Implications: Costs and sustainability are often limiting factor in trialing new models of cardiac rehab. We will evaluate the costs of enhancing on-site programs and whether the cost can be offset by revenue gained through better attendance rates and longer average participation. After this we would like to demonstrate that using smart phone application with limited use of on-site cardiac rehabilitation are able to achieve similar outcomes and be run cost effectively.
Abstract ID: 17
Title: Utility of Cardiac Rehabilitation to Improve Gait Speed and Six-minute Walk Distance in Veterans with Normal vs. Low Ejection Fraction
Authors: Tarolli, Karen, MSN, ACNP-BC, CHFN1; Allsup, Kelly2; Althouse, Andrew1; Smith, Rebecca1; Bello, Nicholas1; Byard, Thomas3; Reeger, Jennifer1; Coughenour, Derek1; Hickey, Gavin1; Lemieux, Nicole1; Forman, Daniel E., MD4.

Introduction: It is well known that gait speed (GS) is a powerful indication of health-associated disease limitations as well as quality of life and six minute walk distance (6MWD) is a useful measure of functional capacity.

Purpose: To study differences in cardiac rehabilitation (CR) to improve GS and 6MWD in patients with low ejection fraction EF <50% (LEF) versus (vs) patients with a normal EF >50% (NEF).

Significance: Exercise training can improve GS and 6MWD. We assessed how CR improved GS in LEF vs. NEF in a Veterans population.

Design: In a CR quality improvement project we evaluated LEF and NEF patients regardless of other cardiac diagnoses and comorbidities. GS and 6MWD were measured at initiation and completion of CR.

Method: Five meter GS was evaluated as the average of three trials. 6MWD was assessed according to American Thoracic Society Guidelines. Data was evaluated at initial enrollment into CR and change scores were evaluated for those that completed pre- to post- assessment.

Results: 109 patients enrolled in CR; 33 with LEF and 76 patients with NEF. Mean GS was 1.09 + 0.32 in the LEF vs. 1.26+ 0.27 in NEF (p=0.011). Mean 6MWD was 272 + 101 in LEF and 335 + 91.5 in NEF (p=0.005). At this time 16 patients completed CR. 4 LEF patients who completed CR achieved improved GS (Δ 0.17 ±0.16; p=0.60) vs. 12 NEF patients who completed CR with improved GS Δ 0.10 ±0.22. 6MWD also improved in LEF patients Δ 70.7±41.4 (p=0.16) vs Δ 37.1 + 37.1 in NEF patients.

Conclusions: LEF patients had significantly lower baseline GS and 6MWD than NES patients. LEF patients trended to higher improvements in GS and 6MWD compared to those with NEF over the course of CR. While this not statistically significant, this is likely due to the limited number of patients assessed to date. As more patients become enrolled and complete CR we expect LEF patients will benefit as much or more from CR than those with NEF.

Implications: This promising GS and 6MWD data suggest benefits of CR for LEF and NEF, and their potential to improve outcomes and quality of life.
Abstract ID: 18
Title: It’s Hit! With HIIT and ETTs
Authors: Knorr, Emily, CCRP
Institution: 1. University of California Davis Medical Center, Sacramento, California, United States.

Introduction, Purpose, and Design: The value in performing symptom-limited exercise tolerance tests (ETTs) stems from the amount of variables collected that pertain to research on exercise training in the cardiac rehabilitation (CR) setting. Contemporary CR programs now include high intensity interval training (HIIT) at two-minute stages of increased speed (RPM) and resistance and up to <80% Max HR during a total interval of 30-60 min. No adverse effects were observed with utilization of the HIIT method. The education of candidates for HIIT with Medicare qualifying diagnoses (e.g., CABG/PCI) was to determine the impact of HIIT upon their functional capacity. Additionally, the impact of HIIT upon the time it took for patients to achieve significant improvements in their functional capacity were determined.

Method, Results, and Conclusion: From January 2015 to December 2015, 42 patients (M=34; F=8; M=66±17 yr F= 54±16 yr, moderate-high risk, EF = 60%, N=42 pts on beta-blockers) performed a pre- and post- ETT and had a significant increase in METs >1-MET goal (CABG pts 2.7 METs, CAD/PCI 1.7 METs). Prior history of physical activity, family support and depression/anxiety scales were accounted for in regard to successful completion of >1-MET increase in functional capacity. Average length of time to achieve 2.7 METs for CABG pts was 13 weeks and for a 1.7 MET improvement by PCI/Stent was 15 wks. Additional benefits of ETT were observed: improvement in double product (19333 increased to 21230) and initially positive ETTs (N = 6) transitioned to negative ETTs at completion of program. Conclusion: utilization of pre- and post-ETT data provides powerful evidence for the impact of HIIT on patients in a cardiac rehabilitation program.
**Abstract ID:** 19  
**Title:** Telehealth: Is an Automated Telehealth System Effective for Long-term COPD?  
**Authors:** Sink, E.; Patel, K.; Groenendyk, J.; Javaherian, K.; Dodds, K.; Blanchard, M.; Ross, W.  
**Institution:** 1. Washington University Saint Louis School of Medicine, Saint Louis, Missouri, United States.

**Introduction:** Monitoring of COPD patients through the use of a telemedicine system may facilitate early detection of breathing exacerbations. We document the development and implementation of a system that intervenes in patient care before dyspneic events develop into debilitating exacerbations. Our aims were to show 1) compliance with a bidirectional telemedicine system and to 2) demonstrate the clinical relevance of COPD-telemedicine. The hypothesis is that patients receiving the intervention will have a longer time-to-hospitalization relative to the control group.

**Purpose:** COPD is now the third leading cause of death in the United States. 50-75% of all COPD-related costs are associated with exacerbations; Medicare spends over $475 million annually on COPD readmissions.

**Design:** We created a system that utilizes existing telephone infrastructure to enable automated, daily breathing assessments. The primary outcome is time to hospitalization in the intervention group versus the control group. Secondary outcomes focus on compliance and satisfaction. We conducted a six-month proof of concept (n=20) and a 12 month RCT (n=120) to assess the clinical outcomes. Both parts occurred in an outpatient clinic of our hospital system.

**Methods:** All subjects enrolled in this study received a daily message asking them to report their breathing as “better”, “worse”, or “the same”. If the subject reported breathing “worse”, an alert was sent to the subject’s PCP by text and email. The provider then contacted the subject to provide the appropriate intervention.

**Results:** Over the six-month pilot, the system made 3,619 breathing assessments. The subjects’ cumulative weekly response rate was 96% and their normalized breathing scores consistently increased over time. The rate of dyspneic events per week fell by 64%. Since the completion of the pilot study, 0 of the 20 subjects required hospitalization for an exacerbation. Preliminary results of the ongoing RCT will be available in June 2017.

**Conclusions:** Prompt reporting allowed providers in this study to remotely alter subjects’ plan of care. 75% of pilot participants reported that they felt as if they were “in greater contact with their medical provider”. The decrease in alerts over time suggests that patients understand how to better manage their disease. This COPD system illustrates an innovative method to facilitate patient-provider communication. Our research demonstrates COPD stakeholders are willing to use this system as part of the standard of care.
Abstract ID: 20
Title: Cardiovascular Risk Factors, Comorbidities, and Concomitant Medications from Three Phase 3 Trials of Perfenidone in Idiopathic Pulmonary Fibrosis.
Authors: Glassberg, Marilyn K.1; Nathan, Steven D.2; Lew, Connie3; Raimundo, Karina3; Day, Bann-Mo3; Stauffer, John3; Chou, Willis3; Noble, Paul W.4
Presenter: Grant-Scott, Latora3.
Institutions: 1. University of Miami Health System, Miami, Florida, United States. 2. Inova Fairfax Hospital, Falls Church, Virginia, United States. 3. Genentech, Inc. South San Francisco, California, United States. 4. Cedars Sinai Medical Center, Los Angeles, California, United States.

Introduction: Pirfenidone is an oral antifibrotic agent with anti-inflammatory properties approved for the treatment of idiopathic pulmonary fibrosis (IPF).

Purpose: The objective of this analysis was to characterize the CV risk factors, comorbidities and related concomitant medications from three Phase 3 trials of pirfenidone in IPF.

Significance: Patients with IPF often have a number of cardiovascular (CV) risk factors and comorbidities and receive related concomitant medications.

Design: This analysis pooled all patients randomized to pirfenidone (any dose) or placebo in the ASCEND and two CAPACITY studies.

Methods: Medical history at baseline and concomitant medication use during the treatment period were reported by investigators. Patients with unstable or deteriorating cardiac disease within the past 6 months were excluded from trial enrollment. We also performed a literature review to identify observational studies of IPF and compared the CV comorbidity rates with rates from the pirfenidone clinical trials. Results: A total of 1334 patients (779 CAPACITY and 555 ASCEND) were included. The mean age was 67 years, 74% were male and 66% were former/current smokers. In addition to age, sex and smoking, other commonly reported CV risk factors were hypertension (52%), hypercholesterolemia (24%), hyperlipidemia (22%), diabetes (20%), sleep apnea syndrome (15%) and obesity (6%). Cardiac disorders as a system organ class were reported in 36% of patients at baseline. Among these, commonly reported conditions were coronary artery disease (17%), myocardial infarction (7%), atrial fibrillation (5%) and angina pectoris (3%). Deep vein thrombosis and pulmonary embolism were reported in 2% and 1% of patients, respectively. These findings are consistent with interim data from prospective real-world registries (INSIGHTS-IPF, IPF-PRO and PASSPORT), although actual rates varied. Concomitant CV medications during the treatment period of the Phase 3 trials included: lipid-modifying agents (60%); anti-thrombotics such as anti-platelets (including acetylsalicylic acid) and anti-coagulants (55%); renin-angiotensin inhibitors (39%); beta-blockers (26%); diuretics (22%); anti-diabetic drugs (20%); and calcium channel blockers (18%).

Conclusions: CV risk factors and comorbidities are common in patients with IPF, including those enrolled in the Phase 3 trials of pirfenidone and in real-world observational registries. Concomitant medications were also commonly used for those conditions.

Implications: Awareness of CV risk factors, comorbidities and concomitant medications is an important consideration in the management and treatment of patients with IPF.
Abstract ID: 21
Title: Assessment of Oxygen Uptake Efficiency Slope on Cardiopulmonary Functional Reserve for Patients with Chronic Obstructive Pulmonary Disease
Author: Zhao, Hongmei 1.
Institution: 1. Beijing Boai Hospital of Respiratory and Critical Care Medicine, Beijing, China.

Objective: To investigate the efficacy of oxygen uptake efficiency slope (OUES) on evaluation the cardiopulmonary function of patients with chronic obstructive pulmonary disease (COPD).

Methods: The cardiopulmonary function of 74 stable COPD patients with the cardiopulmonary function of II ~ IV were evaluated, following a symptom-limited Steep protocol with simultaneous respiratory gas measurement, they were performed exercise tests on a treadmill, at the same time the oxygen uptake (VO2), carbon dioxide production (VCO2), peak oxygen uptake (VO2peak), minute ventilation (VE), and respiratory gas exchange rate (RER) were measured. OUES was derived from the relation between VO2 and VE during incremental exercise and was determined by VO2=algVE+b, where a=OUES, to measure anaerobic threshold (VAT) meanwhile.

Results: OUES correlated with the VO2peak (P<0.001). 75% OUES, 90% OUES and 100% OUES were not significantly different (F=2.569, P=0.277).

Conclusion: OUES could be an objective, stable indicator of the submaximal exercise, its submaximal exercise values were significantly positive correlate with exercise tolerance in stable COPD patients.
Abstract ID: 22
Title: Does Animal-Assisted Therapy Decrease Depression in Cardiac Rehabilitation Participants
Author: Cachuela, Victoria, AD, RN, CCRP; Blair, Annemarie, MSN, RN, CNS, CPT; Dennison, Phyllis, AD, RN, BC-RN; Levens, Paula, AD, RN, BC-RN, CCRP; Smith, Carol, BSN, RN, CCRN; Worth, Lynda, BSN, RN; Baker, Janice, MSN, RN, FHRS, CEPS, NEA-BC.
Institution: 1. Penn Medicine Chester County Hospital, West Chester, Pennsylvania, United States.

Introduction: The primary purpose of this project is to evaluate the effectiveness of Animal-Assisted Therapy (AAT), when used as a holistic therapeutic tool in decreasing the rate of depression in patients attending an outpatient Cardiac Rehabilitation Unit.

Purpose: The PICOT question for the quality-improvement project: When used as an adjunct intervention, does AAT decrease the rate of depression for patients attending outpatient Cardiac Rehabilitation versus patients who attend the same program without the use of AAT?

Significance: The American Heart Association and The American Association of Cardiovascular and Pulmonary Rehabilitation recognize the importance of addressing the psychological status of patients who enter a Cardiac Rehabilitation program, yet depression has been shown to decrease attendance and adherence to Phase-II Cardiac Rehabilitation. A review of the literature supports the relationship between AAT and disease risk management.

Design: This project will utilize a test-retest design. The differences in the scores of the PHQ-9 Depression Assessment Tool will be examined in an effort to identify significant changes in participants who experience AAT in addition to standardized individual plans of care. Any patient 18 years of age and older, who has been referred to Cardiac Rehabilitation following a cardiac event or surgical procedure, has the opportunity of voluntarily participating in the program.

Method: The PHQ-9 Tool will be completed by the patient during the initial interview process and upon graduation from the program. The scores will be evaluated and compared with a control group; those patients attending the same program but without AAT. Certified therapy dogs who hold a national certification along with volunteer owner/handlers will visit in the unit 2 days per week. Participants have the option to brush, walk, and interact with the dogs each week.

Results: There are no results available at this time. This is a pilot quality-improvement project.

Conclusions: This project was implemented on February 15, 2016; therefore raw data will be accessible in June. Patients who have volunteered to participate have exhibited an increase in socialization between other patients, and staff members have commented how the therapy dogs bring a sense of “calmness” and “positive energy” to the environment.

Implications: The application of evidence-based practice methodology remains at the core of improving the quality of life for patients diagnosed with cardiac disease. AAT is a cost-effective, non-pharmaceutical therapy which has the potential to decrease rates of depression for this population.
Abstract ID: 23
Title: Improving Fall Risk Assessment of Cardiac Rehabilitation Participants
Authors: Cachuela, Victoria, AD, RN, CCRP; Blair, Annemarie, MSN, RN, CNS, CPT; Dennison, Phyllis, AD, RN, BC-RN; Levens, Paula, AD, RN, BC-RN, CCRP; Smith, Carol, BSN, RN, CCRN; Worth, Lynda, BSN, RN; Baker, Janice, MSN, RN, FHRS, CEPS, NEA-BC.
Institution: 1. Penn Medicine Chester County Hospital, West Chester, Pennsylvania, United States.

Introduction: The nursing staff in cardiac rehabilitation (CR) recognized the need for a standardized method to identify participants at risk for falling. This quality improvement undertaking was inspired by the lack of an objective process that resulted in a difference of opinion among the staff.

Purpose: To identify an objective method for evaluating participants at risk of falling that would utilize a valid clinical instrument to enhance our practice of safe, high quality patient care.

Significance: Falls are a leading cause for disability and death. After a thorough review of the literature, no studies were found on fall prevention in a cardiac rehabilitation setting. Since closer supervision of such participants can determine safe staffing levels, the group decided to research methods used to identify risk for falling in other patient care settings.

Design: Our quality-improvement project integrates the Timed Get-up-and-go Test (TGUG) and The Fall Risk Assessment Screen. These validated instruments provide clinical assessment tools to identify individuals at increased risk for falls. Also, the TGUG test is the instrument used for inpatient evaluation of fall risk at our hospital. In CR the population consists of participants aged 18 years and older, who meet admission criteria for Phase II Cardiac Rehabilitation. Additional elements of the screening program include identification of recent falls; current medications; and evaluation of current psychological and cognitive status.

Methods: During the initial evaluation before starting CR, we have incorporated the use of TGUG Test and the Fall Risk Assessment Screen. Based on the overall evaluation and the objective data from the newly added screening tools, we rate the individual as low, medium or high risk for falling.

Results: There is no statistical data available due to the nature of the quality-improvement project.

Conclusions: After implementation of the new process, the staff was able to objectively classify a patient’s fall risk. Those at high risk for falling would be assigned one-to-one supervision. Re-evaluation of fall risk can be performed as needed during the prescribed CR program and upon completion.

Implications: The fall risk assessment tools identified have proven to be an objective method to identify CR participants at risk for falling, determine appropriate staffing ratios and evaluate patient improvement at the completion of their prescribed program. In sharing our results, it is our hope that other CR programs will implement a similar process and share their outcomes and experiences in variety of populations and settings.

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Abstract ID: 24
Title: Continuous Blood Pressure Monitoring During High-intensity Resistance Training in a Cardiac Rehabilitation Setting
Author: Brown, Katelyn1.
Institution: 1. Baylor Scott & White Health, Dallas, Texas, United States.

Introduction: Many cardiac rehabilitation (CR) patients have occupations or athletic pursuits that require them to perform high-intensity activities, yet it has been difficult to accurately measure their maximal blood pressure with a manual blood pressure cuff and auscultation. The Finometer blood pressure monitor records continuous heart rate and blood pressure readings and may allow CR patients to perform high-intensity exercise (85% of 1-RM) while maintaining a rate-pressure product (RPP, defined as peak heart rate x peak systolic blood pressure) under the safety threshold of 36,000.

Purpose: To use the Finometer blood pressure monitor during high-intensity resistance training to obtain a more accurate representation of peak myocardial work in the form of RPP. With this information, healthcare professionals in CR settings will be able to better evaluate the feasibility of high-intensity resistance training by keeping the RPP under 36,000.

Design: This study included 5 male CR patients, 18 to 80 years of age, who had a current diagnosis of stable angina, MI, or PTCA with or without stent and who performed high-intensity leg press resistance training while undergoing continuous blood pressure and heart rate monitoring.

Methods: The subjects performed a 1-RM test on the leg press resistance training equipment while the Finometer finger cuff recorded continuous finger arterial pressure. During next 5 sessions, they performed 4 sets of 6 reps at 85% of their 1-RM with 1 minute of rest between. This process was repeated for a total of 10 sessions. A one-sample t-test was used to compare the average RPP for each leg press movement with the safety threshold suggested by current guidelines.

Results: The study subjects reached an RPP (mean ± SD) of 15,379.4 ± 2,626.7 while performing the leg press resistance training exercise, an average that differed significantly from the recommended 36,000 safety threshold (p-value: <0.0001). No adverse events were observed.

Conclusions: The results of using the Finometer to measure continuous blood pressure during high-intensity leg press resistance training indicate that the patients reached an RPP that was substantially less than the currently recommended safety threshold.
Abstract ID: 25
Title: Pirfenidone is an approved anti-fibrotic agent for the treatment of IPF
Authors: Glassberg, Marilyn K.; Nathan, Steven D.; Lin, Chin-Yu; Raimundo, Karina; Stauffer, John; Chou, Willis; Noble, Paul W.
Presenter: Grant-Scott, Latora
Institutions: 1. University of Miami Health System, Miami, Florida, United States. 2. Inova Fairfax Hospital, Falls Church, Virginia, United States. 3. Genentech, Inc. South San Francisco, California, United States. 4. Cedars Sinai Medical Center, Los Angeles, California, United States.

Introduction: Pirfenidone is an approved anti-fibrotic agent for the treatment of IPF.

Purpose: The objective of this analysis was to describe the occurrence of cardiovascular and bleeding adverse events (AEs) in patients with IPF enrolled in three Phase 3 trials of pirfenidone.

Significance: Patients with IPF often have cardiovascular (CV) co-morbidities and/or CV risk factors. It is therefore important to understand the impact of pirfenidone on CV risk.

Design: A retrospective, blinded review of treatment-emergent CV and bleeding AEs (those that occurred up to 28 days post-treatment) in the ASCEND and two CAPACITY studies was conducted. Patients with a history of unstable or deteriorating cardiac disease within the past 6 months were excluded from enrollment into these studies.

Methods: AE preferred terms were examined to identify occurrences of major adverse cardiac events (MACE) which include stroke, myocardial infarction (MI), unstable angina, and cardiac arrest. Patient incidence of MACE and bleeding events is summarized (for the pirfenidone-treated patients, only pirfenidone 2403 mg/day were included).

Results: A total of 1247 patients were included; 623 received pirfenidone and 624 placebo (PBO). Baseline demographics were similar between the pirfenidone and PBO groups: mean age was 68.0 years for both, 74.3% and 74.5% were male, and 66.5% and 64.2% were current/former smokers, respectively. The CV risk profile at baseline was similar between the pirfenidone and PBO groups, including history of coronary artery disease (15.6% and 15.7%, respectively) and MI (5.1% and 5.3%, respectively); more patients in the PBO arm had a history of hypertension (53.8% vs. 49.1%). In the pirfenidone and PBO groups, concomitant antithrombotic agents (including acetylsalicylic acid) were administered to 51.2% and 57.2% of patients, and concomitant lipid-modifying agents to 60.7% and 59.9%, respectively. The mean exposure to pirfenidone and PBO was 14.1 and 14.3 months, respectively. The incidence of MACE (including the proportion of patients experiencing MI or stroke) and bleeding events was similar for the pooled pirfenidone and PBO groups (1.4% and 2.1% for MACE; 3.7% and 4.3% for bleeding events, respectively).

Conclusions: The patient incidence of MACE or bleeding events was similar between the pirfenidone and placebo groups in the pooled ASCEND and CAPACITY studies.

Implications: These results suggest that pirfenidone does not increase the risk of CV or bleeding events in patients with IPF.
Abstract ID: 26
Title: Establishing a Relationship between Cognition and Physical Function in Patients Attending Cardiac Rehabilitation
Author: Bello, Nicholas1.

Introduction: Patients participating in cardiac rehabilitation (CR) often present with limitations in both physical and cognitive function.

Purpose: To quantify the association between physical and cognitive function in patients enrolled in CR.

Significance: CR is a comprehensive program that employs exercise training, education, and behavior modification to improve outcomes in patients with cardiovascular disease (CVD). In order to achieve a treatment plan that is optimally tailored to each patient’s needs, it is important that the relationship between physical and cognitive function be considered, as poor cognition may undercut standard CR therapeutic methods.

Design: As part of a quality improvement initiative in the CR program at the VA Pittsburgh Healthcare System, we evaluated the relationship between function (gait speed, six-minute walk test [6MWT]) and cognition at initiation of CR.

Methods: Baseline physical and cognitive function were assessed in community dwelling CVD patients. Physical function was assessed by 5-meter gait speed (the average of three trials) and the 6MWT (American Thoracic Society guidelines). Cognitive function was measured using the Clock In the Box (CIB) assessment tool. CIB was scored from 0 to a maximum of 8 points (consistent with VA New England Geriatric Research, Education, & Clinical Center guidelines). Correlations between gait speed/6MWT and CIB score were assessed. Linear regression was used to assess these relationships when adjusted for age.

Results: 93 patients (mean age 66 ± 9 years) participating in CR completed all three assessments. Mean gait speed was 1.21 ± 0.28 m/s; mean 6MW distance was 318 ± 96 m; mean CIB score was 6.2 ± 1.8. There were significant but weak correlations between gait speed/CIB (r=0.19, p=0.06) and 6MWT/CIB (r=0.18, p=0.08). When adjusting for age in multivariate regression, the expected increase in gait speed was 0.014 m/s per 1-point increase in CIB (p=0.29); similarly, the expected increase in 6MWT was 4.9 m per 1-point increase in CIB (p=0.39).

Conclusions: Physical and cognitive function in patients enrolled in CR were modestly correlated with one another. These associations are partially explained by age.

Implications: Limitations in cognition may factor significantly in the functional limitations that are common among CVD patients referred to CR. This raises concerns in relation to adherence, education, and even basic mechanisms of disease. More study is needed to understand these relationships particularly as they have bearing on the manner in which CR is best administered for large number of physically limited CVD patients.
Abstract ID: 27
Title: Women and Cardiac Rehabilitation: Evidence-based Barriers and Solutions
Authors: Supervia Pola, Marta, MD, MSc; Yeung, Colin, MD; Medina-Inojosa, Jose R., MD; Brewer, LaPrincess C., MD, MPH; Leth, Shawn E., MEd; Squires, Ray, PhD; Pérez-Terzic, Carmen M., MD, PhD; Lopez-Jimenez, Francisco, MD, MSc; Thomas, Randal J., MD, MS.
Institutions: 1. Cardiovascular Rehabilitation Program, Division of Cardiovascular Diseases and Department of Internal Medicine, Mayo Clinic, Rochester, Minnesota, United States. 2. Department of Physical Medicine and Rehabilitation, Mayo Clinic, Rochester, Minnesota, United States.

Introduction: Cardiac rehabilitation (CR) services improve a variety of clinical outcomes in patients with cardiovascular disease, but such services are underutilized, particularly in women. Purpose: The aim of this study was to better understand evidence-based barriers and solutions to CR participation in women.

Design: A systematic literature search was carried out using PubMed, EMBASE, Cochrane and CINAHL to identify randomized controlled clinical trials, controlled clinical trials and observational studies from the last 10 years, with a sample size of at least 100 subjects, including adults over 18 years of age with CR-eligible diagnoses, that have assessed barriers and/or solutions to CR participation in women.

Methods: Titles and abstracts were screened, and full-text articles were reviewed that met study criteria. To allow us to identify actionable, evidence-based recommendations, each solution was scored by independent reviewers using the level of evidence and the strength of recommendation according to the current American College of Cardiology/American Heart Association guidelines.

Results: From 794 studies that were identified, 10 were found that assessed barriers to CR participation in women, and 22 studies involved methods to improve CR referral, enrollment, and/or completion of CR in women. Only two studies examined the effect of solutions to CR barriers exclusively in female populations. Barriers were categorized into patient-, provider-, and social/environmental-based levels, and included lower level of education, multiple co-morbid conditions, non-English native language, transportation barriers, and high degree of family responsibilities. Automatic/systematic referral, strategies to offer better support for patients, and novel delivery models of CR were identified as solutions with the greatest potential to increase CR referral and participation in women.

Conclusions: Several studies have identified clear and specific barriers to and evidence-based solutions to CR participation for women. However, while systematic approaches to CR referral and participation facilitate CR referral and support CR participation, additional research on the best ways to improve CR enrollment and completion is warranted since relatively few women have been included in such studies. Keywords: Cardiac rehabilitation, women, review, barriers, solutions.
Abstract ID: 28
Title: Protocol for a Global Survey of Cardiac Rehabilitation Programs: Comparing Availability and Delivery Around the World
Authors: Marta Supervia Pola, MD, MSc¹; Lopez Jimenez, Francisco, MD MSc¹; Turk-Adawi, Karam, PhD²; Bjarnason-Wehrens, Birna³; Thomas, Randal, MD¹; Grace, Sherry L., PhD⁴.
Institutions: 1. Cardiovascular Rehabilitation Program, Division of Cardiovascular Diseases and Department of Internal Medicine, Mayo Clinic, Rochester, Minnesota, United States. 2. Faculty of Health, York University, Toronto, Canada. 3. Institute for Cardiology and Sports Medicine, German Sport University Cologne, Germany. 4. Cardiorespiratory Fitness Team, Toronto Rehabilitation Institute, University Health Network.

Introduction: Cardiac rehabilitation (CR) is an essential part of the continuum of care for patients with cardiovascular disease, given the well-established benefits of participation. CR provision at the national level is somewhat understood in several high-income countries in Europe, as well as in North America. Standards for CR delivery have also been established in these countries. There have also been comprehensive surveys administered regarding CR delivery in Latin America, China and the Arab world. Results revealed major variability in funding models, program characteristics, availability and delivery of minimum standards. However, little is known about CR delivery in most countries of the globe.

Purpose: To: (1) assess CR program characteristics, (2) identify barriers to CR delivery, and (3) estimate the density of CR programs by number of inhabitants in each country around the world.

Design: Quantitative, observational and cross-sectional study.

Methods: An anonymous, online survey of CR programs all over the world identified through member lists of participating national CR societies, a Google search, as well as investigators’ contacts, will be undertaken. A maximum of 50 CR programs per country will be randomly selected (where ≥50 centers are identified) and will be emailed an invitation to participate. Non-respondents will be sent 3 follow-up email reminders at 2 week intervals. The survey has been developed based on previous national CR surveys. Items are designed to assess: (1) location of the program in the healthcare system; (2) how CR is funded/reimbursed; (3) program capacity and costs; (4) healthcare professionals on the CR team; (5) components delivered; (6) nature of patients served; (7) alternative models delivered; and (8) barriers to delivery. The survey was piloted in Canada and in countries where Arab is the official language. Then some further revisions were made. Descriptive statistics will be computed for all closed-ended items in the survey. All open-ended responses will be coded. Responses will be compared by country and by economy (defined by the World Bank), through ANOVA or chi-square as applicable. Post-hoc tests will be performed. To test the third objective, the ratio of CR programs to the national population will be computed.

Anticipated Results/Conclusions: By administering a common survey internationally, the global CR community will have better understanding of CR. This information will be useful for health policy-makers, health services researchers and international organizations willing to promote the availability and quality of CR around the world.
Abstract ID: 29
Title: Effects of a Cardiac Rehabilitation Program in Functional Capacity, Quality of Life and Dyspnea in Patients with Chronic Obstructive Pulmonary Disease of VA Caribbean Healthcare System
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Introduction: During the years, the prevalence of respiratory diseases have increase and respiratory diseases have come to play a major role in the mortality and morbidity profiles of the population (Ries, Bauldoff, Casaburi, Emery and Mahler, 2007). Among chronic respiratory diseases, chronic obstructive pulmonary disease (COPD) is the most common (Ries et al. 2007). According to the records data of VA Caribbean Healthcare System (VACHS) in San Juan, Puerto Rico from January, 2011 to October, 2013 there were 1,456 admissions in which COPD was a primary or secondary diagnosis and 633 admissions due to COPD exacerbation. In the VACHS, patients with mild to very severe COPD have been receiving treatment under the Cardiac Rehabilitation program since 2008 and an analysis of the effects of this program in functional capacity, quality of life and dyspnea has not been made yet.

Purpose: The aim of this study was to determine the effects of a Cardiac Rehabilitation program in functional capacity, quality of life and dyspnea that patients with chronic obstructive pulmonary disease of VACHS had from 2011 to 2013. Retrospective outcomes of the pre and post data of the Six Minute Walk Test (6MWT), the Short Form-36 Questionnaire (SF-36) and Dyspnea scores of 38 patients were reviewed. Patients received education about cardiovascular disease and modification of coronary risk factors and lifestyles, physical, occupational and recreational therapy. Statistics were employed using frequencies, percentages, central tendency and dispersion measures. To test the hypothesis a T Student Test for paired data was used. The significant level was set to <0.05. The mean difference distance walked in the 6MWT increased by 47.89 meters (p<.001). Dyspnea decreased by -0.4 (p<.01). Quality of Life increased by 43.68 (p<.001). The results showed an improvement in all the variables measured.

Study Design: A retrospective record review of the pre and post data of the six minute walk test, the short form-36 questionnaire and dyspnea scores of patients with COPD enrolled in the outpatient Cardiac Rehabilitation program of VACHS between the periods from January 1, 2011 to December 31, 2013 was done. These data was obtained from the Scott Care Tele-Rehab Advantage II Data Bank System. Before entering the Cardiac Rehabilitation program patients signed the informed consent to the physiatrist.

Results: The total participants who were diagnosed with COPD and participated from the Cardiac Rehabilitation program was 80, but only data of 63 patients was available. Of the 63 patients, twenty five dropped out of the rehabilitation program due to several reasons including: Consecutive no shows to the treatment sessions, acute exacerbations of respiratory symptoms and transportation problems. Therefore, the data from 38 patients was included for analysis in this study.

There were thirty seven males and one female. The ages fluctuated from forty five to eighty four years old. Two patients (5%) had mild COPD, twenty five patients (66%) had moderate COPD, ten patients (26%) had severe COPD and one patient (3%) had very severe COPD according COPD Gold Classification System. Nine patients (24%) used supplementary oxygen via nasal cannula at 2-3 Liters of oxygen. The first variable of interest was functional capacity which was measured using the Six Minute Walk Test. The mean distance walked in 6 minutes increased by 47.89 meters after the intervention with a standard deviation of 71.8 (95%CI: 24.28, 71.50). These findings were statistically significant showing an increase in exercise capacity (p<.001). The second variable of interest was dyspnea. Dyspnea score was measured using the Borg Modified Dyspnea Scale. It was reduced by -0.4 with a standard deviation of 0.577 (95%CI:-0.6383, -0.1617) showing a level of significance of (p<.01). The third variable of interest was Quality of Life which was measured using the SF-36 Questionnaire. It increased by a mean difference of 43.68 and a standard deviation of 52.2 (95%CI: 26.27, 61.08). This result was statistically significant (p<.001).
Conclusions: According to John Walsh (2014), veterans are three times more likely to develop COPD than the general population. COPD is the fifth most prevalent disease among the veteran population, affecting approximately 15 percent of U.S. Department of Veterans Affairs (VA) healthcare users (Freeman, 2014).

The results of this study support the hypothesis which stated that COPD patients who completed the Cardiac Rehabilitation program at the VACHS from January 1, 2011 to December 31, 2013 showed improvement in functional capacity, quality of life and dyspnea. The results obtained in this study should help to encourage the establishment of a Pulmonary Rehabilitation program at VA Caribbean Healthcare System in San Juan, PR.
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Title: Five Year Outcomes of Cardiac Rehabilitation Program in Hispanic Veterans  
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Introduction: Coronary Heart Disease (CHD) is the leading cause of death in the adult population in the United States. The 2016 Heart Disease and Stroke update of the American Heart Association reported that 15.5 million individuals in the United States have coronary artery disease. Cardiac rehabilitation programs, which have existed for over 30 years, have shown to have an improvement in the patients exercise capacity, lipid profile, body mass index, improved quality of life and decrease mortality and morbidity associated with cardiac diseases. There is only one cardiac rehabilitation program in Puerto Rico and pertains to the Veteran Health Administration (VHA) from San Juan, Puerto Rico which was established in 2000 and is accredited by the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) since 2003.

This study will help document the importance of cardiac rehabilitation program and its impact among the Hispanic Veteran population. It should also reveal improvements in the different outcome measures as well as quality of life of this population, thus providing another tool for patient care that might lead to reduction in re-admissions, improvement in the patient’s functional capacity as well as psycho-emotional health.

Purpose: The main purpose of this study is to evaluate improvements in the rest, exercise and health domains between 2007 and 2011 of the San Juan Caribbean Health Care System Cardiac rehabilitation program.

As our objective we will evaluate for rest and exercise domains if improvement occurred in at least 5 out of the 9 variables between 2007 and 2011. For health domain we will evaluate if improvement in at least 5 out of 8 variables between 2007 and 2011.

Design: Retrospective aggregated program outcomes data of patients enrolled in the outpatient hospital-based cardiac rehabilitation (CR) program of VAH in San Juan, Puerto Rico between the periods of January 1, 2007 until December 31, 2011 was reviewed. Program’s pre and post completion outcomes report, obtained without any patient identifiers and with complete information in regards to the different outcomes was provided by the cardiac rehabilitation personnel in charge of the data, using the Scott Care Data Bank System.

Methods: Outpatient hospital based cardiac rehabilitation (CR) program of VAH in San Juan, Puerto Rico collects pre and post completion outcome data which is generated using the Scott Care Data Bank System without any patient identifiers for accreditation purposes. For this study, we will use three domains provided in the certification report which include rest, exercise and health domains and which are divided in variables (9 for rest and exercise domain, and 8 for health domain.)

Results: Based on the results of the data, the three objectives were validated supporting our hypothesis that Hispanic Veteran patients who participated in the San Juan Caribbean Health Care System Cardiac
Rehabilitation Program would experiment improvements during 2007 and 2011 in at least 2 out of 3 domains. From 2007-2008 the three domains had positive outcomes.

There was an improvement (positive change) in the rest and health domain between 2007-2009.

In 2010-2011 the exercise and health domain had a positive change/improvement.

**Conclusions:** Based on the results, the three objectives were validated supporting our hypothesis. However, disparities in the consistency of validated domains could be explained by a mixture of cardiac with pulmonary patients within the program that occurred starting in 2010.

Despite the mixture of population improvements in blood pressure, maximum HR, double product, cholesterol/triglycerides, 6-minute walk and all aspects of the health domain were demonstrated in those patients that completed the CR program through the five years.

Findings obtained support that the participation in Cardiac Rehabilitation among Hispanic Veterans could lead to similar results as compared to the already published US data in regards to improvements in the health, exercise and rest domains.