

Providing Rural Veterans With Access to Exercise Through Gerofit

Brandon C. Briggs, MS; Chani Jain, MPH; Miriam C. Morey, PhD; Erin H. Blanchard, MS; Cathy C. Lee, MD; Willy M. Valencia, MD; and Krisann K. Oursler, MD, ScM

Clinical video telehealth can be used to deliver functional circuit exercise training to older veterans in remote locations.

Author affiliations can be found at the end of the article.

Correspondence: Krisann Oursler (krisann.oursler@va.gov)

Exercise increases endurance, muscle strength, and functional performance with corresponding gains in mobility, survival, and quality of life.¹ However, even with these benefits and improvements in clinical outcomes, only 15% of adults aged ≥ 65 years follow current guidelines for exercise.² Despite their prior military training, the majority of veterans do not meet physical activity recommendations.³ Time, travel, and support are common barriers to exercise participation and adherence—barriers that are further amplified among older adults.

The Veterans Health Administration (VHA) is recognized as a world leader in telehealth service development. Currently, 677,000 veterans have received telehealth services, which represents 12% of the 5.6 million veterans under VHA care.⁴ Clinical video telehealth (CVT) is widely used within the VHA system to deliver health care that otherwise would not be available to veterans. Veterans who have difficulty traveling to the nearest US Department of Veteran Affairs (VA) medical center (VAMC) can access CVT programs at a participating VHA community-based outpatient clinic (CBOC). The VA has more than 45 CVT programs, including programs for mental health, weight management, cardiology, and dermatology. Outside the VA, cardiac exercise rehabilitation provided by CVT has been shown to be as effective as center-based programs in improving cardiovascular risk factors and functional capacity.⁵ A VHA exercise program that leveraged CVT resources and was dedicated to older adults with a wide range of comorbid conditions would have a

high impact on the health and well-being of older veterans.

Gerofit is a VHA clinical demonstration program of supervised center-based exercise for veterans aged ≥ 65 years. Developed at the Durham VAMC Geriatric Research, Education, and Clinical Center (GRECC) in North Carolina, it has demonstrated improved clinical outcomes, including physical function, mobility, quality of life, and survival.⁶⁻¹⁰ The program offers veterans individualized exercise in a group setting that focuses on improving endurance, strength, and balance. The exercise prescription is based on the patient's physical limitations as identified in a physical performance assessment.

With support from VHA Geriatric Extended Care (GEC) and the Office of Rural Health (ORH), Gerofit was implemented in 10 VAMCs across 8 VISNs. However, barriers such as travel time, distance, and transportation limit participation. Previously, we found that rural veterans lack access to exercise programs.^{11,12} Although some do aerobic exercise (AEX), most do not do resistance training (RT), though they are willing to learn. Access to Gerofit for rural veterans is expanding with recent support from the ORH Enterprise Wide Initiative. Rural program expansion includes several different Gerofit initiatives, many involving CBOCs.

The Salem VAMC Gerofit program sought to adapt the facility-based assessment and exercise procedures into a self-reliant CVT class for its CBOCs. This article describes the development of the Salem VAMC Gerofit CVT program, hereafter referred to as TeleGerofit.

TABLE 1 Comparison of Gerofit Center-Based and Clinical Video Telehealth Programs

Components		Center Based	Telehealth
Assessment of physical performance	Frequency	Baseline, 3 mo, 6 mo, 1 y; then annual	Baseline, 3 mo, 6 mo, 1 y; then annual
	Location	One-on-one in person	One-on-one via CVT
	Endurance	6-min walk test	2-min step test
	Leg strength	30-s chair-stand test	30-s chair-stand test
	Arm strength	30-s 1-arm curl	30-s 1-arm curl
	Agility	8-ft up-and-go	8-ft up-and-go
	Balance	Side-by-side, semitandem, and tandem standing balance tests	Side-by-side, semitandem, and tandem standing balance tests
	Gait speed	10-meter walk test	4-meter walk test
Exercise training	Frequency	3 d/wk	2 d/wk
	Intensity	Rating of perceived exertion: 3-7	Rating of perceived exertion: 3-7
	Time	60-90 min	50-60 min
	Type	Stationary aerobic and resistance equipment	Group circuit
	Location	Fitness center	CVT to CBOC

Abbreviations: CBOC, community-based outpatient clinic; CVT, clinical video telehealth.

PROGRAM DESIGN

Gerofit was established in 1986 at the Durham GRECC as an exercise and health promotion program for veterans aged ≥ 65 years.¹³ Its goal is to prevent or improve functional decline from physical inactivity and age-related conditions. Gerofit targets the geriatric patient population and thus extends beyond cardiac and pulmonary rehabilitation or weight loss programs. The primary exclusion criteria are based on safety issues in the context of a group exercise setting of older adults and include oxygen dependency, unstable cardiac disease, and moderate-to-severe cognitive impairment.

To participate in Gerofit, veterans must be able to perform activities of daily living and self-manage an exercise prescription developed by the exercise instructor based on physical performance testing. These physical performance tests include measures that are independent predictors of disability, loss of independent living, and death, as well as surrogate measures of exercise capac-

ity (eg, strength, endurance, balance).^{14,15} A novel aspect of Gerofit is that the physical performance assessment is used not only to determine physical limitations, but also to individualize the exercise prescription based on the observed deficits in strength, endurance, or balance. These assessments are performed at initial enrollment; 3 months, 6 months, and 1 year later; and annually after that. Currently, the center-based Gerofit programs administer 5 items of the Senior Fitness Test: 6-minute walk, 10-meter walk (10-MWT), 30-second 1-arm curl, 30-second chair-stand test, and 8-foot up-and-go.¹⁵ The side-by-side, semitandem, and tandem standing balance tests from the short physical performance battery also are performed.¹⁶ In addition, participants complete a questionnaire that includes items from the physical functioning scale of the 12-Item Short Form Health Survey (SF-12).

After each assessment, the Gerofit exercise instructor reviews the results with the veteran and formulates an individualized

TABLE 2 Examples of Aerobic Exercise and Resistance Training Used in Functional Circuit Class

Circuit	Aerobic Exercise	Resistance Training ^a
1	Step-ups	Biceps curls
		Chest press
		Lateral shoulder raise
2	Shadowboxing	“Romanian” dead lift
		Side bends
		Calf raises
3	Step-ups	Squat
		Reverse “wood chop”
		Bent over row
4	Lateral side steps	Lateral band walk
		Triceps extension
		Wide pull

^aDumbbell and band options.

exercise prescription along with goals for improvement. Veterans are encouraged to attend supervised center-based exercise sessions 3 times weekly. Classes are offered in a gym or fitness center at the VAMC or in leased space. Each patient uses a cue card that lists an exercise plan personalized for intensity and duration for aerobic exercise (AEX; eg, treadmill walking, stationary bicycling, arm ergometry), RT using dumbbells and weight equipment, and functional exercises for flexibility and balance. Some medical centers also offer yoga, tai chi, or dancing Gerofit classes.

For participants in the Durham Gerofit program, mortality decreased 25% over a decade (hazard ratio, 0.75; 95% CI, 0.61-0.91).⁹ A substudy that included the Psychological General Well-Being Index found that 81% of participants significantly increased their score after 1 year.⁷ Observed initial improvement in physical performance has been sustained over 5 years.^{10,17} One-year results from the recent Gerofit expansion to 6 other VAMCs showed clinically and statistically significantly improved physical performance from baseline to 3-, 6-, and 12-month follow-up.¹⁸

Adaptation of Gerofit to CVT Delivery

Initial work. The Greater Los Angeles VAMC Gerofit program conducted a pilot CVT exercise class of 6 veterans at the rural Bakersfield CBOC in California.¹⁹ Each week, an exercise instructor broadcast a 60-minute exercise class that included warm-up, RT with bands, progressive balance training, and flexibility. Trained student volunteers from California State University in Bakersfield kinesiology program were on site at the Bakersfield CBOC to perform the assessments and aid in exercises during the CVT sessions. Despite the lack of AEX per se, veterans showed significant improvement in endurance as measured by an increase in the number of steps completed in 2 minutes at the 3-month assessment ($P = .049$). Although exercises were not delivered in a circuit format, the improved endurance supported the potential for cardiovascular benefit from RT in older adults.

This pilot project also demonstrated that key components of the Gerofit program could be delivered safely by telehealth with onsite supervision. The Miami VA Healthcare System also offers CVT Gerofit exercise classes broadcast to the rural Florida CBOCs of Key Largo and Homestead.¹¹ The exercise activities offered for the Miami CVT participants incorporate components of AEX (calisthenics) and RT (resistance bands). Veterans enjoyed the classes, and adherence was good. However, availability of staff and space are an ongoing challenge.

In Key Largo, 5 veterans participated before the CVT classes were placed on hold owing to the demands of other CVT programs and limited availability of the telehealth clinical technician (TCT). The Homestead CBOC continues to offer CVT Gerofit exercise classes and has 6 regular participants. Notably, the physical space at the Homestead CBOC is smaller than that at the Key Largo CBOC; the Homestead CBOC has adjusted by shifting to exercises performed while standing or sitting, ensuring participants' safety and satisfaction.

The Baltimore, Maryland VAMC Gerofit program offers other innovative CVT exercise classes, including a tai chi class, and a class with exercise performed while sitting in

a chair. Although the Baltimore VAMC CVT exercise classes do not have the scope of the center-based exercise prescriptions, they are unique in that they are broadcast not only to their affiliated CBOCs, but also other Gerofit programs in different VISNs.

Salem VAMC Gerofit Program. The center-based Salem VAMC Gerofit program was established in July 2015. In fiscal year 2017, its dedicated exercise facility had more than 5,000 patient visits. Despite the program's success, we prioritized establishing Tele-Gerofit because of the medical center's rural location in southwest Virginia and the large number of veterans who receive care at CBOCs. Therefore, much as with the pilot CVT Gerofit classes in Los Angeles and Miami, the target setting was rural CBOCs. The goal for Salem VAMC Tele-Gerofit was to modify Gerofit delivery to the CVT format and a CBOC setting with minimal modification of the content and personnel requirements of both physical performance testing and exercise training procedures. Key stakeholders included the Salem VAMC telehealth program, which provided dedicated video technology equipment at the medical center and support of CBOC telehealth clinical technicians; CBOC medical staff, who referred patients and helped develop safety procedures; and CBOC facility directors, who allocated space and time in the CVT schedule. Differences between Tele-Gerofit and the center-based Gerofit program are summarized in Table 1.

Adjustments for CBOC Setting. The enrollment process for Tele-Gerofit is the same as that for the center-based program. To start, a veteran's primary care provider reviews the list of eligibility criteria and, if the veteran qualifies, places a consult. A Gerofit team member then contacts the veteran by phone to describe the program and schedule an assessment. At the baseline physical performance assessment, American College of Sports Medicine guidelines on exercise participation, health screening, and exercise intensity are used to evaluate veterans and rank them by their cardiovascular risk.²⁰ All new program participants start with low-intensity exercise and gradually progress to recommended levels of exercise. Before starting an exercise class, participants are

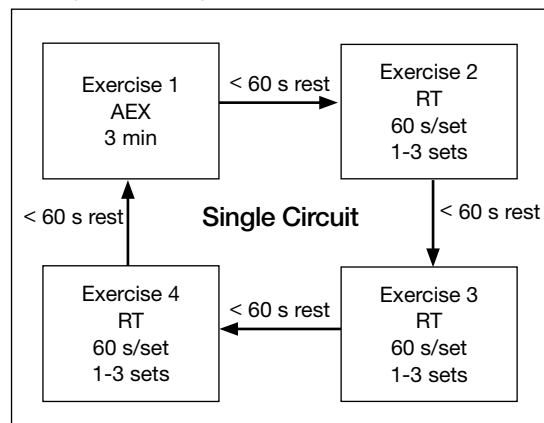
instructed on use of the 10-point rating of perceived exertion (RPE).

Each CBOC site is supplied with an RPE poster that is displayed for participants' use. During a Tele-Gerofit class, the exercise instructor asks participants to periodically report their RPE. This class differs slightly from the center-based exercise sessions in which RPE is primarily assessed when a different exercise is introduced or the duration or intensity of an exercise is increased. The Gerofit instructor monitors exercise and treatment fidelity, but the onsite TCT observes for safety during class. The TCT also takes initial vital signs and sets up the room for the class. Emergency contacts and procedures are posted in each CBOC CVT room and are available to the center-based exercise instructor. Because the CBOCs are not inside medical facilities, some CBOC directors have asked that heart rate monitors be used as an extra safety precaution to ensure that high-risk participants do not exceed a heart rate limit that may be set by their cardiologists.

Modifications to Physical Performance Assessment. Physical performance testing had to be adapted to the small rooms available at the CBOCs. For measuring normal gait speed, the 10-MWT was replaced with the 4-meter walk test (4-MWT). The 4-MWT has excellent test-retest reliability with an intraclass correlation coefficient (ICC) of 0.93, but the discrepancy in gait speed between the 4-MWT and the 10-MWT is such that the tests cannot be used interchangeably.²¹ For measuring endurance, the 6-minute walk test was replaced with the 2-minute step test (2-MST). In older adults, the 2-MST has a moderate correlation with 6-minute walk distance ($r = 0.36$; $P = .04$) and high reliability (ICC, 0.90).^{15,22} The 30-second 1-arm curl, the 30-second chair-stand test, and the 8-foot up-and-go test are performed without modification and require only dumbbells, a chair without wheels, and a stopwatch.

The exercise instructor at the Salem VAMC conducts physical performance testing by 2-way videoconferencing with the veteran in a room at the CBOC. The TCT at the CBOC assists by measuring and demarcating 4 meters on the floor and a designated height on the wall for knee elevation for 4-MWT

FIGURE. Overview of Exercise Circuit Design for Single Circuit of 12 Minutes



Abbreviations: AEX, aerobic exercise; RT, resistance training.

and 2-MST, respectively. The TCT remains in the room during the assessment visit. Except for taking vital signs before and after the physical performance assessment, the TCT does not participate in the testing. To date, more than 20 physical performance assessments have been conducted without difficulty at Salem-affiliated CBOCs. The primary challenge has been scheduling the room with CVT equipment (ie, camera and screen) for the 30-minute individual assessment session, which occurs on a rolling basis as individuals are enrolled and followed.

After the assessment is completed, the exercise instructor reviews the results with the participant and provides feedback on areas in need of improvement. However, these education sessions can be lengthy and are best supported by giving the patient a personalized handout. A goal of Tele-Gerofit is to improve the education session by following up with a phone call to discuss material that is mailed to the veteran; this material includes the questionnaire used in the parent program.

Functional Circuit Exercise. In Tele-Gerofit, exercise training is delivered by CVT broadcast from the Salem VAMC to veterans in a room (equipped with steps, dumbbells, chairs, and bands) at the CBOC. This type of exercise training, which uses only mobile equipment and plyometric (weight-bearing) exercises, is referred to as *functional exercise*. The AEX includes marching in place, moving on and off a raised step, and body-weight exercises, while RT uses

dumbbells, resistance bands, and plyometric exercises (Table 2). Formal balance exercises are included in the cooldown at the end of class, but gains in balance also are obtained from the functional AEX.

Progression of intensity is achieved by increasing the rate of stepping and the size of the steps (AEX) or the number of repetitions and the weight of the dumbbells or bands (RT). Each veteran exercises at an intensity level that is appropriate for his or her baseline limitations and medical conditions. The exercise instructor uses different forms of the same equipment (eg, heavier dumbbells, higher steps) to vary intensity among individuals while having them perform the same exercises as a group. The challenge is to adjust the pace of the AEX or the timing of the RT repetitions for individuals new to the class.

Delivery of exercise training in the form of circuits allows for a diverse exercise program in a setting with limited space. Circuit training is an exercise modality that consists of a series of different exercises, each usually completed in 30 to 60 seconds, with minimal rest between each type of exercise. Each Tele-Gerofit circuit has a mix of AEX and RT exercises performed for 3 minutes consecutively (Figure). The instructor can vary the number of exercise types per circuit as well as the number of times each exercise is repeated (an exercise set). All participants are led through each of the exercises in a single circuit before the class takes a break between each circuit. Individuals who cannot complete 3 minutes of the AEX or all the RT sets may rest during the circuit.

The design of the circuit training can be adjusted based on the number of individuals in the class. Larger classes can be split into 2 groups that alternate between exercise sets, while smaller classes have 1 group performing the same exercise set and then rotating to either the AEX or RT set. Total exercise time to complete the circuit depends on the number of different exercises, number of repetitions, and the rest between repetitions and the different exercises. In this way, total exercise time can be made shorter or longer depending on the veteran's capacity.

Frequency. Tele-Gerofit exercise classes are currently offered twice weekly and

last about 1 hour, which includes warm-up (8-10 minutes), functional circuit training (40 minutes), and cooldown/stretching (8-10 minutes). A challenge for the exercise instructor is the need to provide ongoing clear instructions both to the class and to individuals as needed. As the exercise prescription for each patient is based on physical performance testing, the exercise instructor for the training must be familiar with the test results. Derivation of the exercise prescription in Tele-Gerofit follows the same process as center-based Gerofit.

Each patient is given an exercise prescription written to address any impairments noted in the different domains of the physical performance assessment, scored using age and sex percentiles. For instance, individuals scoring poorly on lower body strength are given specific lower body strengthening exercises. Participants are given an exercise program that guides them toward achieving recommended physical activity guidelines using their RPE to modulate each exercise. Duration and intensity of each type of planned exercise are formally discussed after initial and follow-up assessments. In addition, exercise training is informally progressed throughout the program. For Tele-Gerofit, instructors must design each class with the group in mind while being prepared for modifications and specific changes for individuals.

DISCUSSION

Tele-Gerofit adapts the well-established center-based Gerofit program to be executed without an exercise facility while maintaining the content of the evidence-based procedures. Physical performance testing and exercise training were modified, adding elements necessary for CVT assessments and classes to be broadcast from the Salem VAMC to its affiliated CBOCs. Tele-Gerofit exercises are performed in a circuit style that allows a veteran or small structured groups of veterans to move among exercises and requires less space than traditional group exercise does. Safety and monitoring concerns are addressed with a safety procedure that includes emergency plans for each site, prescreening of enrolled participants, and monitoring of exercise inten-

sity in accordance with national guidelines.¹ Similar to the center-based Gerofit program, the exercise prescription is tailored to each veteran's physical limitations based on initial and ongoing assessment of physical performance. Tele-Gerofit physical performance testing fulfills the same need with only a few modifications using validated measures. Tele-Gerofit assessments are administered by CVT without the need for additional staff on site.

Adaptation of center-based Gerofit exercise classes to Tele-Gerofit is a major innovation. Use of a circuit exercise design was supported by findings in older adults that RT alone, when performed quickly with minimal rest between each set and exercise station, increases both aerobic capacity and strength.^{23,24} Older adult RT trials that compared circuit RT with traditional RT found that strength gains are comparable between circuit and traditional RT.²⁴⁻²⁶ Working with adults aged > 60 years, Takeshima and colleagues conducted a trial of circuit exercise with added callisthenic exercises performed in place between RT on exercise machines.²⁷ This dual-modality (AEX+RT) circuit approach was well tolerated and effective, increasing aerobic capacity and strength. Unfortunately, the resistance exercise machines used in those circuit exercise studies and in the center-based Gerofit program are not an option for Tele-Gerofit.

The requirement for an exercise facility was removed by designing Tele-Gerofit exercise to include only functional exercises that rely on body weight or small mobile exercise equipment. Although popular among young adults, functional circuit exercise is understudied in older adults. Recently, a 12-week functional circuit exercise intervention in frail elderly adults demonstrated significant improvements in gait speed and the timed chair-stand test.²⁸ A pilot observational study of Gerofit participants at the Canandaigua VAMC offered 27 veterans functional circuit exercise instead of their traditional exercise facility class and found larger increases in the timed chair-stand test and 6-minute walk distance compared with 11 Gerofit participants in the traditional program.²⁹

This Tele-Gerofit exercise training combines functional and circuit exercise

strategies into telehealth delivery. However, its effect on physical performance remains to be demonstrated. To address this question, we are conducting a single-arm pilot study of Tele-Gerofit with CVT broadcast to 3 Salem CBOC affiliates (Wytheville, Staunton, and Danville, Virginia). The goal is to determine the effect on physical performance and collect feasibility data, including attendance rate and patient satisfaction with the video broadcast. In addition, we are planning an effectiveness trial to compare the impact of functional circuit exercise delivered in person (center based, not CVT) with the parent Gerofit exercise program on direct measures of endurance and strength, in addition to physical performance.

Implementation research is needed to determine how Tele-Gerofit can be disseminated to other VAMCs and community-based centers beyond CBOCs. Although the cost of the equipment used to implement Tele-Gerofit is minimal, the program requires dedicated and experienced exercise instructors, and the sharing of telehealth resources with other clinical programs. The authors expect that a diverse group of stakeholders is needed across service lines of primary care, geriatrics and extended care, physical medicine and rehabilitation, and telehealth. Of note, this multidisciplinary collaboration is a hallmark of the Gerofit program. The recent success of the implementation of center-based Gerofit in VAMCs across the US demonstrates the program's flexibility and robust results.¹⁸

Plans also include refining strategies for physical performance testing and exercise monitoring. For instance, we would like to adapt telehealth technology for heart rate monitors that can be worn by high-risk veterans at the CBOC and viewed in real time by the exercise instructor. Gerofit is currently being developed nationally for home use, which would remove the need to travel to a CBOC.

CONCLUSION

Gerofit, which is designed to help older veterans maintain independent living and prevent disability, has been demonstrated to improve quality of life and survival. Our goal has been to adapt Gerofit to CVT and pro-

vide a supervised, individualized exercise program in a group setting—a program that can be widely disseminated. Salem VAMC Tele-Gerofit is an innovative and prescriptive program that delivers CVT functional circuit exercise training to remote locations without the need for stationary exercise equipment. This approach has the potential to become an effective and feasible exercise strategy for preventing and minimizing disability in the increasing population of older veterans. Work is needed to determine whether Tele-Gerofit provides a rapid translation of Gerofit to clinical practice and improved outcomes with substantial cost savings from reduced hospitalization and institutionalization.

Authors

Brandon Briggs is an Exercise Physiologist, **Chani Jain** is a Biostatistician, and **Krisann Oursler** is a Physician and the Director of Geriatric Research and Education at the Salem VAMC in Virginia. **Miriam Morey** is Associate Director of Research in the Geriatric Research, Education, and Clinical Center (GRECC) at Durham VAMC in North Carolina. **Erin Blanchard** is an Exercise Physiologist and **Cathy Lee** is a Physician in the GRECC at the Greater Los Angeles VAHS in California. **Willy Marcos Valencia** is a physician in the GRECC at the Miami VAHS in Florida. Dr. Morey is a Professor at Duke University Medical Center in Durham. Dr. Lee is an Associate Professor at the David Geffen School of Medicine at University of California Los Angeles. Dr. Valencia is an Assistant Professor at University of Miami Miller School of Medicine and Florida International University in Miami, Florida. Dr. Oursler is an Associate Professor at Virginia Tech Carilion School of Medicine in Roanoke, Virginia.

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