

GME: Gym in Medical Education - Maintaining Physical and Mental Well Being During the COVID-19 Pandemic

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INTRODUCTION

Setting and Problem

The coronavirus pandemic has limited the safety of public spaces, including gyms. Even as spaces slowly reopen, usage is limited by restricted times, required reservations, and capacities which do not benefit resident physicians with limited free time. Furthermore, despite social distancing guidelines, the gym represents a potentially contagious area. The Texas Medical Association COVID-19 Task Force and Committee on Infectious Disease categorized working out at a gym as high risk at 8 points out of 10 possible points.

In recent years, resident wellness has taken a high priority in many resident programs. Maintaining resident physical activity has beneficial effects on mental and physical wellness, which in turn allows residents to more effectively learn and develop into compassionate providers. Beyond the potential impact on patient-provider relationships, surgical specialties carry a significant ergonomic toll and exercise may improve both mental focus and physical performance in the operating room. However, during this pandemic, access to typical areas of physical activity has been greatly reduced. This report describes a safe and cost-effective alternative to public gyms.

Intervention

A home gym was established in a resident apartment using the following equipment: S-2 Squat Stand, MIL Spec Echo Bumper Plates at 250, and Echo Bar 2.0 (Rogue Fitness, Columbus, Ohio), and Rubber Weight Room Tiles (Shaw Industries, Dalton, Georgia) (**Figure 1**). The respective prices as of 2020 are \$425, \$400, \$205, and \$80 for a total of \$1030. The footprint required is 7.25 feet by 4 feet with a 7.67 feet height clearance. The selection represents a mid to high-range quality and can be scaled up or down based on personal preference.

DISCUSSION

The benefit of this home gym is the 24/7/365 availability without safety concerns regarding SARS-CoV-2. The busy resident can not only have a readily available health and fitness center within their own home, but also reduce time strain from commuting to and from a public gym. A resident spending 20 minutes commuting to and from a gym 5 times a week would hypothetically save 173 hours (7 days) of travel time per year. Furthermore, with residencies ranging from 3 to 7 years,



Figure 1: Home Gym

this one-time investment would cost on the order of \$28.61 to \$12.26 a month (much lower than typical gym memberships). On an overall wellness scale, individuals who work out may spend less money on healthcare, suggesting that the more available physical fitness may have increasingly impactful lifetime health cost-savings.

With this in-house gym, the authors have been able to perform resistance and high intensity interval training,

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maintaining strength and cardiovascular fitness without possible exposure to Sar-CoV-2. Co-residents have been invited and have participated in workout sessions, while maintaining adequate safe social distancing guidelines. Furthermore, this intervention is not specialty or location specific and can be applied broadly.

The benefit of this selection of equipment is that it allows for not only anaerobic strength and resistance training, but also cross-training that may incorporate high intensity and low intensity, and therefore aerobic, routines. Therefore, all benefits from a range of types of exercise are possible with the proposed intervention.

Incorporating resistance and anaerobic training has been shown to increase insulin sensitivity, lean body mass, basal metabolic rate, bone mineral density, and strength [1]. Aerobic training benefits include prevention and potential reversal of cardiovascular disease and maintenance of metabolic homeostasis [2]. Exercise likely decreases cancer risk through body weight maintenance and other biochemical mechanisms. Sympathetic activation during exercise has been shown to promote IL-6 driven natural killer cell processes to re-locate and target tumorous sites [3]. Exercise alters the gut microbiome milieu and decreases colonic transit time which reduces the dwell time for carcinogens, leading to reduction in colorectal cancer risk [4, 5].

Exercise in general exerts a positive effect on sleep quality, and further may act as a source of hormetic stress which positively affects neurotransmitter release and, in turn, neuropsychiatric disorders [6, 7]. For example, cathepsin B released from skeletal muscle contraction improves memory function by stimulating the release of brain-derived neurotrophic factor, promoting neurogenic pathways while protecting against degenerative processes [3]. It is well known that exercise acutely increases endogenous opioids (endorphins) that can also improve psychological well-being and alleviate depression and anxiety [8].

Specific to those in healthcare, a structured exercise intervention (aimed to reduce burnout) has been shown to increase quality of life [9]. Baseline physical activity amongst medical students was associated with higher quality of life and lower risk of burnout [10]. Exercise also improves ergonomic outcomes such as balance, posture, and back pain [11, 12, 13]. In total, exercise has been acknowledged as an effective primary prevention for up to 35 chronic disease including diabetes and cardiovascular disease [14] and has been shown to improve neuropsychiatric status which may translate into a healthier workforce with whom this intervention is suggested.

The goal to maximize both aerobic and anaerobic fitness may not be accomplished with single-use cardio equipment typically employed for “home gyms” (i.e., an exercise bike or a treadmill). Such varied goals require more of a diversified set-up—which is accomplished simply, effectively, and at minimal cost to budget and space by the aforementioned recommendation. Furthermore, using a barbell instead of a dumbbell set allows for customization of weights as well as a higher end range of weight. A multitude of exercises can be performed on this platform: powerlifting, Olympic weightlifting, aerobic and anaerobic cross-training.

Regimen Recommendations

Powerlifting consists of three core movements: the squat, bench press, and deadlift. These movements can be programmed based on 1 repetition maximums with programs such as Starting Strength and 5/3/1 with more advanced programs including Smolov and the Sheiko methods [15, 16, 17]. Programs vary in total volume of tonnage lifted per repetition but rely upon a theory of linear progression allowing adequate recovery time. Alternatives to linear progression include RPE-based programs (rate of perceived exertion), which allow the athlete to rate the difficulty of their lifts and know how to

progress safely and effectively.

Olympic weightlifting includes the clean and jerk, snatch, and other variations. As with powerlifting, various programs are widely available (eg. California Strength and Catalyst Athletics) [18, 19].

Aerobic and anaerobic cross-training programs incorporate low and high intensity movements and are promoted by well-known groups such as Misfit Athletics, CompTrain, and Invictus Fitness [20, 21, 22]. Cross-training exercises that can be performed with this in-house set-up include thrusters, toes to bar, pullups, as well as any powerlifting and Olympic weightlifting variations.

LIMITATIONS

Limitations to implementation include space constraints, though this set up only requires 29 square feet and its height requirement would fit under average ceilings (standard doors are 6.67 feet). Over the lifetime of the equipment, monthly costs are miniscule compared to typical monthly gym memberships, but the initial one-time investment may be difficult on a resident's salary. While anaerobic and aerobic exercise are possible on the described layout, it is more amenable to anaerobic resistance and high intensity training. However, this type of exercise causes reliable growth of skeletal muscle mass and therefore has the closest relationship with the aforementioned hormonal benefits of exercise. The components of this described home gym may be iterated to maximize physical and mental health based on the athletic preferences of individual residents.

CONCLUSION

Investment in a home gym is a cost-effective, time-effective, and safe strategy to maintain physical and mental well-being for residents of any specialty, preventing burnout and enhancing wellbeing so that they may provide high quality patient care.

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