24-Hour Fitness: the Orthopedic Resident On-Call Workout

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Introduction

In-house call is an important component of orthopedic surgery residency, with a significant portion of the post-graduate year (PGY)-2 and PGY-3 duties devoted to 24-h clinical shifts in the hospital. A majority of this time is spent attending to the needs of pre- and post-operative patients and responding to emergency department (ED) and inpatient consultations—activities that demand priority over non-clinical endeavors. However, there is occasionally time available for other pursuits such as research, study, sleep, and exercise.

A variety of publications have demonstrated the need to promote resident physical activity [1, 2, 5, 7, 12] and the beneficial effects it has on both the mental and physical well-being of the individual resident and his or her ability to provide high-quality clinical care [4, 11, 14]. In an effort to encourage resident fitness and improve patient care, an assortment of exercises were developed that can be performed while on-call using only repurposed supplies that are readily available in the hospital.

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Equipment and exercises

All of the materials used are familiar and accessible to an orthopedic resident (Fig. 1a, b). A makeshift kettlebell is a versatile piece of equipment that is assembled as follows (Fig. 1b): Two 3-L irrigation bags (sterile water, Baxter International Inc., Deerfield, IL) are placed in a 6-in. stockinette (Medline Industries Inc., Mundelein, IL), which is tied on each end. The remaining slack in the stockinette is fed through perineal post-foam (Armacell AP/Armaflex Microban 25/50, Armacell International Holding GmbH, Münster, Germany). If additional weight is desired, a 20-lb weight bag (Vinyl Water Bag, Freeman Manufacturing Co., Sturgis, MI) such as that typically used for skeletal traction can be used in place of irrigation bags. The kettlebell can be used for a variety of exercises, including swings (Fig. 2a, b), biceps curls (Fig. 2c, d), triceps extensions (Fig. 2e, f), and shoulder shrugs (Table 1).

A walker (Medline Industries Inc., Mundelein, IL) is used for suspended upper extremity exercises. For example, dips (Fig. 3a, b) and shoulder shrugs are easily executed. Additionally, core exercises, including L-sits (Fig. 3c) and suspended leg raises may be performed.

An Esmarch bandage (Sklar Surgical Instruments, West Chester, PA) supplants therapy bands for the on-call resident. The Esmarch may be tied to a door handle for exercises that stabilize the rotator cuff such as shoulder circles, resisted internal rotation, and resisted external rotation (Fig. 4a, b). Seated rows may be performed sitting in a chair (Fig. 4c, d). Standing on the mid-portion of the Esmarch bandage provides balanced bilateral resistance for biceps curls, shoulder shrugs, resisted empty cans, lateral raises (Fig. 4e, f), and lower extremity squats. The Esmarch can be applied over the shower bar of the call room bathroom for latissimus dorsi pull downs (Fig. 4g, h).

Abdominal crunches, push-ups, and general stretching are performed on a blanket laid on the call room floor. To

Fig. 1. Orthopedic resident on-call workout equipment featuring an assembled **a** kettlebell and **b** component parts.

round out a comprehensive workout, the resident may consider stair-climbing or running in a hospital stairwell to maximize lower extremity conditioning and cardiovascular endurance.

Discussion

It is widely accepted that frequent exercise has a myriad of positive effects on both mental and physical health and is beneficial in the prevention of chronic disease [3]. The Accreditation Council for Graduate Medical Education (ACGME) has mandated that residency programs take actions to minimize resident fatigue and burnout in order to optimize patient safety [10]. Regular resident exercise is an intervention that may complement ACGME compliance efforts. However, even with a work week limited to 80-h [10], residents may find it difficult to routinely dedicate their free time to exercise.

Multiple studies have shown that residents have lower levels of physical activity and general wellness [2], even when compared to medical students and attending physicians [1]. A 2010 investigation found that resident physicians had significantly lower bone mineral density (BMD) than healthy controls, with inadequate physical activity significantly correlated with diminished BMD [7]. Furthermore, resident fitness appears to decline over the course of residency, with residents more likely to be overweight (body mass index ≥ 25 kg/m²) at beginning of PGY-3 year than at beginning of PGY-1 year (49 versus 30%, odds ratio 2.26, 95% confidence interval 1.19–4.28) [5].

Resident inactivity, poor health, and burnout are not inevitable outcomes for residents. Weight et al. [14] demonstrated that implementation of a regular exercise program resulted in a significant increase in resident quality of life and a trend toward decreased levels of

burnout. Similarly, Lebensohn et al. [4] used an online questionnaire to survey resident physicians and discovered that exercise was one of the behaviors most associated with higher levels of general well-being. These benefits may directly improve patient care, with regular resident exercise resulting in a significant increase in residents' confidence in and perceived success of patient exercise counseling as well as a trend toward increased frequency of such counseling interventions [11].

Nemani et al. [9] recently reviewed the qualities displayed by exemplary orthopedic residents; these included important factors such as trustworthiness, efficiency, and professionalism. However, notably absent from this list was physical fitness. In 2011, Subramanian et al. [13] found that a cohort of orthopedic surgeons were physically stronger than their anesthesia colleagues. The authors speculated that this observed difference was attributable to the physical requirements necessary to perform orthopedic surgery [13]. Whether in the operating room or in the ED, many of the tasks inherent to orthopedic surgery require some degree of muscle strength (e.g., reducing dislocated prosthetic joints and inserting surgical implants), which could be cultivated during down-time in on-call periods.

The collection of fitness equipment and exercises presented here can be combined in a myriad of ways to produce a well-rounded on-call workout. An example workout is provided in the Table 1. Note that the assigned repetitions for each exercise are suggested numbers only and can be modified to match the fitness and strength level of the participant. Furthermore, the sample program is neither gender- nor specialty-specific, but it can easily be tailored to address individual needs and goals. Proper pre- and post-workout stretching and warm-up is suggested [6]. Residents may subdivide their workout into shorter segments performed over the course of the day if on-call responsibilities do not

Fig. 2. Selection of kettlebell exercises—**a, b** swings; **c, d** biceps curls; and **e, f** triceps extensions.

permit completing a full workout in a single session. Evidence suggests that multiple short bouts of exercises confer health benefits similar to a single continuous session [8].

The assortment of exercises presented by no means represents a comprehensive list, and residents should be encouraged to explore their available supplies and

facilities to devise an armamentarium of fitness resources. Caution must be employed when selecting these materials as they are typically hospital property and should be either acquired once otherwise slated for disposal or returned in mint condition at the conclusion of the workout. Even in the absence of such supplies, a broad array of exercises can be performed with no

Table 1 Example workout

Exercise	Equipment	Sets ^a
Shoulder circles	Esmarch	25 each direction, each arm
Internal rotation pulls	Esmarch	25 each arm
External rotation pulls	Esmarch	25 each arm
Empty cans	Esmarch or kettlebell	25 each arm
Dips	Walker	10
Squats	Esmarch or kettlebell	15
Leg raises	Walker	10
Biceps curls	Esmarch or kettlebell	20 each arm
Triceps extensions	Esmarch or kettlebell	20 each arm
Seated row	Esmarch, chair	25
Kettlebell swings	Kettlebell	20
Latissimus dorsi pull downs	Esmarch	15
Push-ups	Blanket	20
Crunches	Blanket	30
Stair climbs	Stairwell	10 flights

^a Perform entire workout three times over the course of an in-house call

equipment whatsoever (e.g., lunges and jumping jacks). However, the authors found fabrication of workout apparatus to be an enjoyable activity that encouraged exercise participation. The addition of relatively inexpensive commercial equipment, including a door-mounted pull-up bar (Complete Chin Up Bar, Astone Fitness, Richmond, BC, Canada) and a dip station (P-245 Dip Bars, Atlantis Inc., Laval, Quebec, Canada) may also be considered to increase the effectiveness and variety of an on-call workout regimen.

A diverse assortment of exercises can be performed while in the hospital. Even if workouts are spread over fragmented, short sessions of free time, such as those available to on-call orthopedic surgery residents, significant health benefits can be achieved. Furthermore, enhancing resident access to physical activity improves their well-being and ability to provide high-quality patient care. To the authors' knowledge, this is the first paper to formally

propose a workout regimen specifically designed for the on-call resident. By making a case for the potential benefits of on-call workouts and presenting a sample fitness routine, we hope to inspire further research to quantify the effects of on-call exercise.

Disclosures

Conflict of Interest: Peter B. Derman, MD, MBA, Joseph Liu, MD, and Alexander S. McLawhorn, MD, MBA have declared that they have no conflict of interest.

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Fig. 3. a, b Dips and c an L-sit demonstrated on a walker.

Fig. 4. Examples of exercises performed with an Esmarch bandage—a, b external rotation pulls; c, d seated rows; e, f lateral raises; and g, h latissimus dorsi pull downs.

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