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Personalized Full-Body In-Bed Gym at home: lessons from personal experiences

Ugo Carraro[1-4]

[1]Department of Biomedical Sciences, University of Padua; [2]CIR-Myo-Interdepartmental Research Center of Myology, University of Padua; [3]A&C M-C Foundation for Translational Myology, Padua; [4]Department of Neurosciences, Physical Medicine and Rehabilitation School, University of Padua, Italy

Abstract

Muscles and mobility deteriorate with age, and exercising is the only sure countermeasure. It is useful to offer safe and toll-free rehabilitation training, such as the Full-Body In-Bed Gym, easy to learn and perform at home. Based on my own experience, I suggest a 10-20-minute daily routine of easy and safe physical exercises that may improve the main 300 skeletal muscles used for everyday activities. Many of the exercises can be performed in bed (Full-Body In-Bed Gym), so hospital patients can learn this light workout before leaving the hospital. The routine consists of a series of repetitions of bodyweight exercises to be performed one after the other, without time breaks in between. Alternating sequences of arm and leg exercises are followed by moving body parts in lying and sitting positions in bed and by standing and sitting down. Progressive improvements can be tested by a series of push-ups on the bed or the floor. Starting from 3-5, the number of repetitions is increased by adding 5 more every week. To maintain or even shorten the total daily time of workout, each movement is then speeded up. The devoted time every morning (or at least 5 days a week) to train all the major muscles of the body can remain under 15 minutes. Because there are no breaks during and between sets, the final push-ups become very challenging. At the end of the daily workout, heart rate, depth, number of spontaneous ventilations, and frontal perspiration increase for tens of minutes. Here is an example of how to implement the progression of the Full-Body In-Bed Gym, presenting an educational case report of a trained 80-year-old person in stable pharmacological management. Details of the workouts and the related results are presented in the 2024 book, *How to Rejuvenate at 80's*. Positive results on quality of life, mental wellness, and persistence in a group of older adults were recently reported in a scientific publication. Although performed in bed, in addition to strengthening the main muscles, ventilatory ones included, Full-Body In-Bed Gym at home is a resistance training equivalent to a short jog. Started in early winter and continued regularly throughout spring and summer, Full-Body In-Bed Gym can help maintain the independence and mental wellness of elderly people. It is a simple approach that deserves further clinical trials.

Correspondence: Ugo Carraro, Department of Biomedical Sciences, University of Padua, Via Ugo Bassi, 58/B, Padua, Italy.
E-mail: ugo.carraro@unipd.it

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Introduction

Having turned 80 on February 23, 2023, I am very interested in what international literature offers on the possibility of keeping oneself if not in perfect shape, at least having the possibility of leading a normal life both from a working and an emotional point of view. In fact, I am lucky enough to be able to enjoy a beautiful garden and two fields near Padua with two vegetable gardens and two rows of wine trees that delimit the lateral boundaries of the second field. Sixty vines, if cared for during spring, summer, and early autumn, produce enough grapes for me to drink my wine. Paid help from neighbors or professionals is difficult or too expensive, so I do almost everything myself. In fact, I receive less and less help, even from my wife, who has serious walking problems due to progressive knee pain that can only be partially controlled pharmacologically. The literature on aging (and on the prevention/treatment of the inevitable associated problems) is so vast that not even the innovations of artificial intelligence can distill the few tips that could allow me to "rejuvenate" at least to the level of efficiency I had at 70 years old. On the other hand, with age, the desire to stay fit also passes, so

most older people are poorly trained, and therefore the expectation of reasonable progress through physical exercise is attractive and achievable.

A personal experience during a prolonged hospitalization gave me the opportunity to experience how fast and extensive the loss of muscle function and mass is due to the inevitable limitations of common daily activities, and even more so for me, who dedicated a lot of time to the manual labor of an amateur farmer. In fact, I had to spend 2 months in the Surgery Vascular Unit of the Padua Hospital waiting, after an initial positive blood culture, for three negative results requested by the surgeon to intervene with one intra-femoral artery stent to reconstruct a reliable wall of a femoral aneurysm that had previously formed in my left knee. I therefore began not only to walk tediously in the long corridors of the clinic, alone or with companions in misfortune, but also to do a minimum of gymnastics, which I did almost all in bed so as not to disturb my five roommates. I thus experienced and appreciated the continuous improvements in my "working capacity" resulting from a short daily routine of voluntary physical exercises while lying down, sitting, and getting out of bed. There are "exercise gyms" within the hospital, but their use is limited by the availability of workstations compared to the number of patients in a large general hospital such as that of Padua.

The goodness of my naive approach was strengthened when, in a few weeks, an old hospitalized roommate, who had been bedridden for months due to arteriosclerotic problems in his legs, imitated me during my gymnastics sessions and, with the help of a walker, managed to independently reach the bathroom for morning bodily needs, much to the joy of the entire six-bed dormitory. Full-Body in-Bed Gym at home was born!

So, I decided to spread this experience among friends and acquaintances, most of whom were already used to going to gyms and playgrounds. Not even the gratuitousness of doing physical exercise at home has convinced most people, who perhaps attend group sessions (yoga, tai-chi, or gyms) more for the company of occasional acquaintances than for the advantages that derive from it since these are mostly once a week or at most bi-weekly events.

I also published reports on Full-Body in-Bed Gym in serious scientific journals and inserted videos on YouTube. But overwhelmed by the competition of sports science professionals and physiotherapists, all my efforts remained in vain because my personal opinion clashed with the meta-analyses published by anti-aging professionals on studies of hundreds or thousands of subjects. I do not want to recall the mockery of my physiology colleagues, although they had important examples of methodologies developed by individual experimenters, sometimes capable of transforming errors into discoveries that remained in the history of medicine. Suffice it to recall the heroism of those who were the first to self-inject pathological microorganisms to demonstrate the effectiveness and safety of the vaccines they had invented almost on their own. An interesting book on the topic is published only in Italian (but deserves translation into many languages): *Eroica, folle e visionaria. Storie di medicina spericolata*.[1]

Full-body in-Bed Gym at home

I have no space here to describe in detail how to start and continue the Full-body in-Bed Gym at home and how it can also be adapted for subjects who, like me, have occasional low back pain. In fact, some exercises can aggravate low back pain and should be avoided. Interested readers may find the full details in the listed references and in the 2024 book *How to Rejuvenate at 80's* (Figure 1).[2-20]

On the other hand, the *sine qua non* of the Full-Body in-Bed Gym at home is that the numbers and intensity of the exercises should be continuously increased, maintaining them at the upper personal limits. When they become too easy to perform, this can be achieved by increasing the number of repetitions of each exercise and/or the duration of each muscle contraction and/or by speeding up their execution. I will also mention below some structural analyses that corroborate the functional observation of an increase in fatigue resistance, which rewards the persistency of those who perform the exercises at least 5 days a week. But it is always a matter of a few dozen minutes a day to dedicate to yourself! In fact, only world champion master athletes are at their peak performance,[3] all the other elderly people, especially those who lead a sedentary lifestyle, are far from being like that.

Thus, it is always possible to rejuvenate through training (that is, to increase physical performance). I describe here a modality that can be performed at home to safely train all the major muscle groups essential for a normal lifestyle. Indeed, most or all exercises can be performed in bed.

You can evaluate for yourself whether home training is effective, *i.e.*, whether you are rejuvenated, based on how easily you carried out normal daily activities 5 or 10 years earlier. Good examples are the number of steps you can take when going up and down stairs; dressing, in particular wearing socks and trousers, with or without having to sit or lean against the wall; sitting down and getting up from hygiene devices whose use is mandatory during the day; and so on.

Finally, I would like to point out that, at least at the University Hospital of Padua, Italy, enrollment, education of patients, and follow-up for the Full-Body In-Bed Gym to be performed at home are free of charge.[4,5]

In short, I can say that there are about 700 skeletal muscles in the human body, including roughly 200 that are serious bone-movers and another 100 little muscles of the hands, feet, head, and face. This short report aims to convince people in need and their practitioners to counteract age- or rest-related muscle decay by maintaining the best function, strength, fatigue resistance, and shape of the main body muscles.[4,5]

Geriatric subjects, due to advanced age and/or associated diseases, spend only a short period of time on daily physical activity. The consequent disuse of muscle atrophy contributes to limiting their independence, ultimately forcing them to stay in bed and to be hospitalized for longer periods. Low mobility-related muscle atrophy is associated with neuromuscular weakness, functional limitations, thromboembolism, and high costs.[6-8] All progressive muscle contractile impairments need permanent management. Education of sedentary patients to perform home physical exercises could be an effective, low-cost alternative during and after hospitalization.[9-12]

Cardiovascular and respiratory physical rehabilitation protocols for surgical patients are well-established approaches, whose main goal is to reverse muscle weakness/atrophy.[13,14] We extended those routines to a daily short (10-20 minutes) sequence of easy-to-learn, safe, and tool-free volitional physical exercises to be performed in bed at the hospital or at home (Full-Body in-Bed Gym) to improve muscles and, hence, mobility in impaired people.

For untrained people, the series could start with 3-5 repetitions of each of 15 free-body physical exercises: i) closing hands; ii) extending and flexing ankles; iii) extending arms and closing hands; iv) cyclic movements of the legs in a lying position in bed; v) deep inspirations aided by arm movements; vi) lying in bed, flexing the chest; vii) sitting in bed, left and right torsion of the neck and head; viii) sitting on the bed, raising the body on the hands; ix) in a sitting position on the bed, extending and flexing the spinal cord; x) in a sitting position, stretching your legs; xi) in a sitting position, rotating the head; xii) stretching and rotating your arms above your head; xiii) getting out of bed, even on tiptoe to load the body weight on the

soleus muscle; xiv) (only after a few weeks of bed training) push-ups on the floor; xv) one final stand-up from the floor.

To see a video that dynamically depicts the Full-Body in-Bed Gym sessions, both at low and higher speeds please refer to https://youtu.be/pcHKmxCLYFs.[15]

I am happy and proud to stress that the positive results I described above were confirmed by a study showing positive results on quality of life, mental wellness, and persistence in a group of older adults who were enrolled recently in a study carried out by Maria Chiara Maccarone and other 20 to-be-specialists in Physical Medicine and Rehabilitation of the School of Physical Medicine and Rehabilitation of the University of Padua.[5]

I can add that we have ultrasound evidence that extending to 5 seconds the "up-bridge" of the in-bed exercise improves the quality and quantity of the Gluteus medius muscle (personal communication of the observations of Dr. Daniele Coraci, Department of Neuroscience, Section of Rehabilitation, University of Padova, Padua, Italy).[18-20] After Dr. Daniele Coraci performed an ultrasound analysis of the muscles of my arms, body, and legs in early spring 2023, he stated that the muscles of my arms and legs, although relatively thin due to my age, had the ultrasound appearance of young muscles, while the buttocks were those of a very sedentary elderly person.

I was happy with the positive information and not surprised by the negative part because it is well known that it is not easy to effectively train the glutes without the aid of training machines. However, Dr. Coraci suggested that I maintain the "bridge" exercise for at least 5 seconds and relax slowly. This modified exercise should improve my glutes. I did this for the next 3 months and then returned to the Rehabilitation Unit of the Department of Neuroscience of the University of Padua for the follow-up by muscle ultrasound. Of course, Dr. Coraci was absolutely right! His suggestion is now included in the "optimized routine" of the home Full-Body in-Bed Gym.

Limitations

I must warn readers that it is mandatory to personalize the Full-Body In-Bed Gym at home in the case of patients with mobility disorders using the advice of expert physiatrists and physiotherapists.

Since it is a frequent mobility disorder, I report the case of low back pain.

Personalized Full-Body in-Bed Gym in case of low back pain

Here I want to point out how it is appropriate to behave when episodes of illness, more frequent in the elderly, force one to interrupt the morning physical activity even for just a few days.

In the case of one of the many episodes of mild lower back pain (that I experienced since I was 20 years old), I always resolved more or less quickly with a little resting or, in other cases, with an ortho-

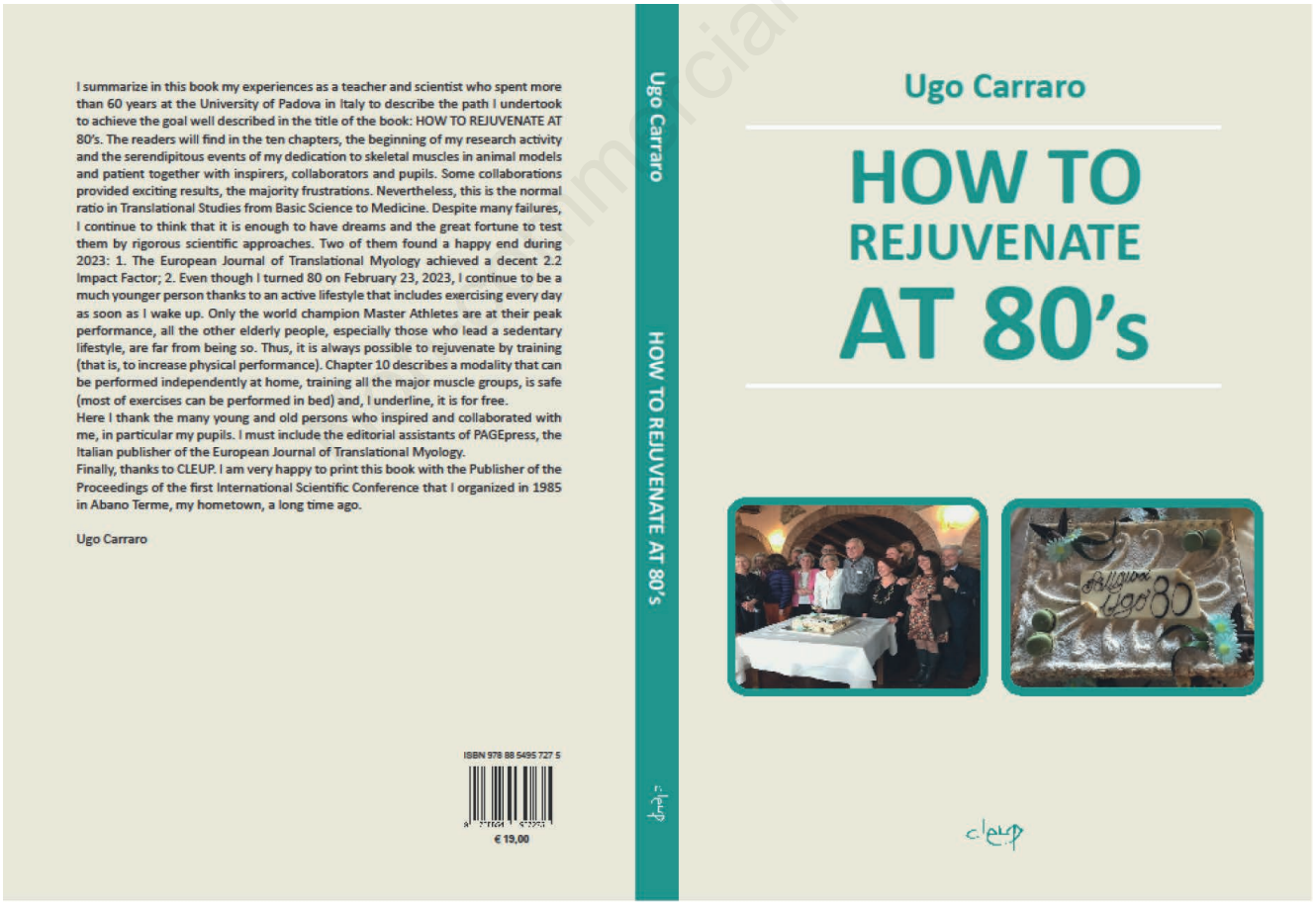

Figure 1. Details of the workouts and the related results are presented in the 2024 book *How to Rejuvenate at 80's*. Reproduced from: Carraro, 2024 with permission of Coop. Libraria Editrice Università di Padova.

pedic corset. During December 2023, I had an episode of low back pain that obliged me to discontinue the morning gym and use the corset from December 7 to January 7, 2024. While during this period I never did push-ups, from December 11, 2023, I performed a lighter workout that carefully avoided contraction of the muscle of the back. I call this a minimal workout for low back pain, consisting of 16 gym exercises: 7 lying – hands + feet + ventilation with arms up + forced feet stretching + mini bridge lying in bed + forced max ventilations + alternating one-leg cycle; 6 standard seating exercises; 3 stand-up/sit-down exercises consisting of standing up, standing on tiptoe, and sitting down with squats held for 1 second; no push-ups. Then, starting on January 7, 2024, I returned very slowly to the standard Ugo's home Full-Body in-Bed-Gym by incremental post-low back pain routine consisting of cautious additions of exercises. In particular, initially, I pushed up on the bed and then on the floor, lifting only the torso, and maintaining my knees on the bed or the ground. Finally, since January 24, 2024, I have reached what is now my "2024 new standard", having added new exercises lying in bed. This 2024 new standard consists of 23 gym exercises: 13 lying in bed, *i.e.*, 10 repetitions of hands, ankles, arms up, forced stretch ankles, ventilation with arm-up, mini bridges, cycling with both legs up, alternating extended leg up, max deep ventilations, alternating one leg stretch, cautious 2-leg up, rising shoulder with extended arms on bed, body bending; 6 standard sitting exercises; 3 stand-up/sit-down, *i.e.*, stand, stand on tiptoe, sitting down with 3-second squats, push-ups up to 30; body bending on the floor; final stand up.

Perspectives

I have no difficulty admitting that what I reported in the scientific literature could be just my dreams and that there is only one way to evaluate them: find collaborators and money to design and implement a sound, evidence-proven series of clinical studies.

Luckily, I have good friends who trust me and have invested their scientific credibility to test my dreams with positive results.[4,5] Now they are open to continuing this strategy by implementing new clinical studies to test previous and new clinically relevant hypotheses, *e.g.*, to study: i) hospitalized geriatric patients; ii) new approaches to clinical imaging, and iii) non-invasive protocols for biomarkers.

In fact, I am crazy enough to propose mouth fluid analysis to test myokines and the role of oximetry changes related to Full-body In-Bed at home in all elderly people and, in the case of overweight, by integrating hemi-fasting approaches.[2]

Conclusions

In conclusion, although performed in bed, in addition to strengthening the main muscles (ventilatory muscles included), Full-Body In-Bed Gym at home is resistance training equivalent to a short jog. Started in early winter and continued regularly throughout spring and summer, Full-Body In-Bed Gym at home can help maintain the independence and mental wellness of elderly people. It is a simple, safe, and free approach that deserves further testing through good clinical trials.

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