Clinician's Commentary on Sawant et al.¹

In their systematic review, Sawant and colleagues¹ address limitations of previous reviews and provide a systematic analysis of a focused clinical question in the field of renal rehabilitation: What is the impact of resistance training on skeletal muscle mass in people undergoing haemodialysis (HD)? In so doing, the authors have sifted through the body of knowledge, distilled the precious essence of this research, and passed to us a demi-glace of truth: if you follow currently published protocols and extrapolate from the given evidence on the resulting effect size, about 1 in 9 people on HD would be expected to achieve a clinically significant increase in muscle mass as a result of exercise therapy.

This number seems surprisingly small when set against the backdrop of prevalent media regarding the benefits of exercise. We are inundated with messaging that “exercise is good,” to the point that this message is ubiquitous in our culture and our practice. In an excellent article recently published in *Scientific American*, extolling the virtues of exercise, Bassuk and colleagues build an inspiring case for the magical properties of routine exercise.² It can be difficult to imagine justifying further research in the field of clinical exercise therapy, for what questions could possibly remain unanswered? Sawant and colleagues provide us with needed justification to continue to advocate for ourselves both as regulated health practitioners and as researchers.

In reflecting further on their findings, I considered three clinical interpretations that could explain the small observed effect size. First, it could simply be that the true effect size was “watered down” by the heterogeneity of the participants and of the interventions used in the included studies. Standing against this interpretation is the fact that the overall population of included participants is surprisingly homogeneous in age (although a noted limitation to the generalizability of their findings is the lack of studies including HD patients over age 60—a significant limitation, given the steadily rising age of the average Canadian HD patient). Furthermore, their findings are consistent with previous observations in the population with chronic obstructive pulmonary disease (COPD), another chronic health condition characterized by persistent disease progression,³ which would suggest that perhaps this small effect size is to be expected. Furthermore, the small observed improvement in muscle mass could perhaps translate into larger functional gains. Others have identified moderate to large effect sizes on outcomes sitting further up the World Health Organization's International Classification of Functioning framework. For example, in a study by O'Shea and colleagues, while a small effect size was observed on muscle mass, moderate to large effect sizes were observed for muscle strength, physical function, and quality of life among people with COPD.⁴ Another review article on exercise and chronic kidney disease noted moderate effect sizes in walking capacity and quality of life.⁵ Perhaps small improvements in absolute muscle mass may actually translate into larger functional gains overall.

A second possibility is that this increase, though small, deserves tremendous praise. Several factors conspire against a haemodialysis patient's efforts to even maintain muscle mass; while dialysis is a life-sustaining therapy, it is by no means a cure. A few years ago I heard Dr. Roberta Bondar, Canada's first

female astronaut, speak. She talked at interesting and engaging length about several topics related to her experiences with the space programme, including the physiologic challenges of long-space flight. When exposed to micro-gravity, astronauts lose bone and muscle mass at an accelerated rate comparable to that observed in postmenopausal women,⁶ and this exposure bodes ill for their long-term health; space is truly a hostile environment for our physiology. She spoke about studies that evaluated the role of exercise in managing these negative influences for astronauts and about the prevailing evidence at the time, which showed minimal benefits from such initiatives.⁷ She then posed a question that I have often reflected on since when thinking about chronic disease: “What do you think matters more, the 1 hour a day that we exercise or the 24 hours of zero gravity?” If for 24 hours a day a person is subjected to a chronic disease and/or management strategies for that disease that have stacked the physiologic deck against the prospect of building muscle, perhaps even a small effect size should be regarded as monumental.

My third reflection on the small effect size presents itself as a challenge for our practice: If the treatment were designed better, could better outcomes be possible? The biomedical model has received a beating in recent years; taken in isolation, it is far from perfect. As physiotherapists, we can draw on evidence from several fields in support of a biopsychosocial model of function;⁸ a person's participation in life is not determined solely by the disease with which he or she has been diagnosed. As a physiotherapist almost 20 years into my practice, I feel that I understand this philosophy intuitively and have difficulty recalling a time when I did not hold it to be true. But as much as a biopsychosocial model resonates with me, at times I find myself defending the biomedical model, if only because its vision is cure.

As much as health promotion and prevention are central to physiotherapy practice, a core theme of our profession is optimizing recovery. True recovery is predicated in part on reversing, or at least minimizing, an underlying impairment. Through this lens, rehabilitation is an intrinsic part of the cure. There is no magic wand; nothing can ever set in order all the effects of disease or injury at a single shot. Neither the direct effects of a pathology nor those imposed indirectly as the collateral damage of chronic disease can ever be instantaneously reversed. Even when the underlying impairment can be removed (e.g., a tendon repaired), and the natural processes of healing allowed to occur, recovery takes time, patience, and work to restore what was lost.

Sawant and colleagues' article reminds me of the importance of efforts to collaborate with our partners in other health care professions toward a coordinated vision of recovery. Should we continue to advocate for a health-promotion message of physical activity, regardless of health status? Absolutely. Physiotherapists and our occupational therapist colleagues are uniquely trained to work with patients to accommodate the permanent restrictions created by chronic disease and to promote optimal physical activity. However, at the heart of physiotherapy lie the science and the art of exercise and physical activity prescription, which work in concert with the scope of practice of other members of the health care team and, ultimately, with the efforts of

our clients themselves to address underlying impairments and functional limitations. A recent study⁹ has shown that increasing the workload of exercise training (through innovative equipment), combined with correcting an underlying nutritional impairment, resulted in increased bone and lean muscle mass among the 13 residents of the International Space Station.⁹ These findings suggest that the environmental toxicity imposed by micro-gravity requires (a) a recalibration of the training prescription and (b) optimally coordinated inter-professional interventions that address underlying impairments to achieve the desired outcome. This example challenges us to consider how our existing therapies might be used adjunctively to achieve better outcomes for our patients. How does this operationalize in the field of renal rehabilitation? To begin with, in taking the opportunity to collaborate with our medical colleagues who set dialysis prescriptions: as better practice models (nocturnal dialysis, home HD), increased access to transplants, and/or novel renal replacement therapies (regenerative medicine, wearable kidney) are developed that offer better management of the underlying disease, new opportunities for better rehabilitation outcomes come into being. While that horizon is distant, it is important not to become complacent in our expectations and to continue to advocate for better options on our clients' behalf.

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REFERENCES

1. Sawant A, House AA, Overend TJ. Anabolic effect of exercise training in people with end-stage renal disease on haemodialysis: a systematic review with meta-analysis. *Physiother Can.* 2014;66(1):44–53. <http://dx.doi.org/10.3138/PTC.2012-59>
2. Bassuk SS, Church TS, Manson JE. Why exercise works magic. *Sci Am.* 2013;309(2):74–9. <http://dx.doi.org/10.1038/scientificamerican0813-74>. Medline:23923211
3. O'Shea SD, Taylor NF, Paratz J. Peripheral muscle strength training in COPD: a systematic review. *Chest.* 2004;126(3):903–14. <http://dx.doi.org/10.1378/chest.126.3.903>. Medline:15364773
4. O'Shea SD, Taylor NF, Paratz JD. Progressive resistance exercise improves muscle strength and may improve elements of performance of daily activities for people with COPD: a systematic review. *Chest.* 2009;136(5):1269–83. <http://dx.doi.org/10.1378/chest.09-0029>. Medline:19734323
5. Heiwe S, Jacobson SH. Exercise training for adults with chronic kidney disease. *Cochrane Database Syst Rev.* 2011;(10):CD003236. <http://dx.doi.org/10.1002/14651858.CD003236.pub2>. Medline:21975737
6. LeBlanc A, Schneider V, Shackelford L, et al. Bone mineral and lean tissue loss after long duration space flight. *J Musculoskelet Neuronal Interact.* 2000;1(2):157–60. Medline:15758512
7. Cavanagh PR, Licata AA, Rice AJ. Exercise and pharmacological countermeasures for bone loss during long-duration space flight. *Gravit Space Biol Bull.* 2005;18(2):39–58. Medline:16038092
8. Engel GL. The need for a new medical model: a challenge for biomedicine. *Science.* 1977;196(4286):129–36. <http://dx.doi.org/10.1126/science.847460>. Medline:847460
9. Smith SM, Heer MA, Shackelford LC, et al. Benefits for bone from resistance exercise and nutrition in long-duration spaceflight: Evidence from biochemistry and densitometry. *J Bone Miner Res.* 2012;27(9):1896–906. <http://dx.doi.org/10.1002/jbmr.1647>. Medline:22549960

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