Disclaimer

The author is not currently practicing in the health/fitness field. The author poses the hypothetical situation: "Within my scope of practice, this is how I would best address the objectives of this assignment".

Additionally preceding the following "reinforce" discussion, the author assumes: no clinical presentation of "pain"; the "reset" portion has been successfully conducted (e.g. addressing breathing, and posture), and any mobility issues have been resolved (mobility before stability) in order to "earn stability".

Prolonged-Sitting/Sedentarism and Lumbar Instability

Prolonged-sitting (i.e. sedentarism), particularly "slumped", creates a prolonged lumbar spinal-flexion posture associated with: postural issues at the shoulder complex, cervical and thoracic areas; low back pain; increased pressure/degeneration of the intervertebral discs; compromised disc-nutrition; higher herniation rates; increased insults on the facet joints; higher compressive forces as compared to standing; greater passive tissue stress (both proximally and distally) particularly when combined with lateral bending/twisting (e.g. sitting and reading for objects) as compared to standing; passively stretched multifidus resulting in bilateral internal oblique and transverse abdominis fatigue due to co-contraction to compensate/stabilize the back; spinal ligamentous creep/laxity (instable) after 3 minutes of full flexion; decreased reaction time (in stabilization) and decreased utility of proper lumbopelvic hip complex (LPHC) kinematics compensated by greater end-range loading of the spine (e.g. hinging at the spine instead of at the hips) (Castanharo, Duarte, & McGill, 2014; Liebenson, 2002; Liebenson, 2003; McGill, 2010; Wang, Weiss, Haggerty, & Heath , 2014; Waongenngarm, Rajaratnam, & Janwantanakul, 2016).

Proper trunk mobility and stability (especially under load) are essential to activities of daily living--from how we carry ourselves as we walk around to picking up children, carrying groceries, and reaching for objects.

Corrective Rationale: Reinforcement

Clinical "pain" should have been addressed before mobility. Mobility precedes stability, and a stability "reset" (e.g. reboot) must precede "reinforcement". The work leading up to [spinal stability] "reinforcement" should have included (but not limited to) LPHC mobility, proper breathing mechanics, the intra-abdominal pressure mechanism, and postural control/alignment (supine, sitting, standing) in conjunction with breathing (Key, 2013; Shveyd, 2014).

Reinforcement (preceding reloading or "feed-forward core training) is sensorimotor (with greater emphasis on the neurological) re-patterning/re-programming which may be either protective (keep the positive changes, prevent regression) and/or corrective (improve upon the positive changes) (Cook, n.d.a.; Shveyd, 2014). Reinforcement not only helps the sensorimotor system re-program motor control, but also learn a new way to perceive, as quoted from Gray

Cook: "we can't expect them to behave differently if they can't perceive differently" (Heiler & SportsRehabExpert.com, n.d.). Reinforcement should promote retention/sustainability of the "reset".

With the "sitting" population in mind, "protective" reinforcement could include (but not limited to) addressing/education on: postural and lifestyle changes in the workplace/home; taking regular, periodic micro-breaks to stand up, walk around the office, or simply perform a quick posture check; scheduling "breathing" breaks; and adjusting ergonomics (e.g. rearrange workplace/home furniture or purchase accessories or better chair) to promote tall/active-sitting or improved sitting-posture (Heiler & SportsRehabExpert.com, n.d.; Wang et al., 2014).

Reflexive core/trunk stability is the ability to dampen local forces in order to facilitate/promote force production elsewhere, and the ability to react/coordinate/activate quickly and proportionally with proper timing/sequencing--this is stabilization (Cook, 2014; Nickelston, 2013). The purpose of corrective reinforcement for trunk stability would be to challenge the stabilizers' coordination and timing (Cook, 2014).

Corrective Exercises: Reinforcement

To quote Dr. Stuart McGill (Stanford lectures, Cook/McGill/Liebenson debates): "It depends." The following exercises are presented (in no particular order) as examples of reinforcement, but their applicability depends on the individual's situation and capacity.

1. Supine Reflexive Core Training.

Please refer to the video at https://youtu.be/Hss2jJq2BpM for detailed instructions. The video includes progressions. The video is part of an article which may be found at: http://www.functionalmovement.com/articles/Fitness/466/training_the_core_the_core_of_2014_part_2

2. Quadruped Pushback.

Please refer to the video at https://youtu.be/Z-WcdWSX9Bc for detailed instructions. The video includes progressions (alternating arms). The video is part of an article which may be found at: http://www.dynamicchiropractic.com/mpacms/dc/article.php?id=56411

3. Quadruped Arm/Leg Extension.

Please refer to the video at https://youtu.be/r02ATcCqm7w.

Begin in quadruped position. Alternately extend contralateral arm-leg simultaneously, slow and controlled. Progress to ipsilateral arm-leg extension. One may further progress this exercise by placing airex pad under the hands/knees to create a less stable surface. However, aggressive unstable surfaces are not recommended as they may cause injury (i.e. don't use wobble board or inflatable cushion).

4. Hip Hinge (progress A to D).

Total body exercise that promotes trunk and LPHC coordination.

a. Toe-Touch. Please refer to this video: https://youtu.be/n7l4iW5N41M

b. Wall-Bangers or Chair-Rises.

Wall Bangers video https://youtu.be/QkG6NXLaNGk

Chair-Rises (refer to the article http://www.bodyandbalancecenter.com/BodyandBalanceCenter.com/Chair_Rise_and_Squatting.html)

c. Hinge with Dowel (please refer to the video: https://youtu.be/s1I_dfTVZ8s).

d. Progressive Hip Hinge / Gray Cook Demonstration (please refer to the video: https://youtu.be/ile7azMZpLA)

Reference

Castanharo, R., Duarte, M., & McGill, S. (2014). Corrective sitting strategies: An examination of muscle activity and spine loading. *Journal of Electromyography and Kinesiology, 24,* 114-119.

Cook, G. (n.d.a.). *The three R's* [Audio Lecture]. Retrieved from http://www.otpbooks.com/product/gray-cook-the-3-rs/

Cook, G. (n.d.b.). What's in a toe touch? Retrieved from http://graycook.com/?p=1261

Cook, G. (2014, October 21). Is stability the same as motor control? Retrieved from http://www.functionalmovement.com/articles/Podcasts/520/is_stability_the_same_as_motor_control

Heiler, J., & SportsRehabExpert.com. (n.d.). Teleseminar interview 6 - Gray Cook. Retrieved from http://www.sportsrehabexpert.com/public/465.cfm

Key, J. (2013). 'The core': Understanding it, and retraining its dysfunction. *Journal of Bodywork & Movement Therapies, 17*(4), 541-559.

Liebenson, C. (2003). Clinician's information for self-help procedures. Activity modification advice: Part 1 -- the hip hinge. *Journal of Bodywork & Movement Therapies,7*(3), 148-150.

Liebenson, C. (2002). Clinician's information for self-help procedures.
Are prolonged sitting postures bad for the back? *Journal of Bodywork & Movement Therapies,6*(3), 151-153.

McGill, S. (2010). Core training: Evidence translating to better performance and injury prevention. *Strength & Conditioning Journal, 32*(3), 33-46.

Nickelston, P. (2013, March 15). The quadruped pushback for reflexive core stability. Retrieved from http://www.dynamicchiropractic.com/mpacms/dc/article.php?id=56411

Shveyd, L. (2014, March 6). Training the core: The core of 2014 part 2. Retrieved from http://www.functionalmovement.com/articles/Fitness/466/training_the_core_the_core_of_2014_part_2

Wang, H., Weiss, K. J., Haggerty, M. C., & Heath, J. E. (2014). Original article: The effect of active sitting on trunk motion. *Journal of Sport and Health Science, 3,* 333-337.

Waongenngarm, P., Rajaratnam, B. S., & Janwantanakul, P. (2016). Original article: Internal oblique and transversus abdominis muscle fatigue induced by slumped sitting posture after 1 hour of sitting in office workers. *Safety and Health at Work, 7,* 49-54.