D4: Adjusting back supports for positioning and function: The theory and practice

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Learning objectives:
Upon completion of the session participants will be able to:

1. Identify two components of back supports that impact on positioning and function.
2. Describe how to accommodate or correct a lordosis, kyphosis or rib distortion within a back support.
3. Compare and contrast two back supports that have multiple adjustments.

Session Description:
Wheelchair positioning is critical for function, comfort, prevention of pressure and fixed deformities.

The pelvis is considered the foundation of seating and a physical assessment starts with the pelvis (1). The trunk naturally follows the pelvis and back supports should be considered along with cushions for optimal positioning. For example: accommodating the curve of a kyphosis within an adjustable back support along with a cushion to accommodate posterior pelvic tilt for optimal pelvis, trunk and head position.

Over the past two years back supports with multiple adjustments have come onto the New Zealand market. These can be adjusted to meet specific positioning needs and offer an alternative to custom fabrication.

There is limited research on how back supports can be adjusted for positioning and function. The results from a literature review will be discussed in relation to recline (2, 3, 4), back support angle (5), height (1, 6, 7) and shape (8, 9, 10).

The International Classification of Function will be used to identify factors to consider when prescribing back supports.

During the presentation, participants will be shown how to adjust back supports for people with kyphosis, lordosis, scoliosis, rotation and rib distortion. Photographs of back supports that have been set up for specific positioning will be presented.

A brief overview of the back supports available within New Zealand will be given.

Back supports will be on display from a variety of suppliers giving participants a unique opportunity to experiment, compare and contrast.

Content references:

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3. Kobra, K., Fujita, D., Osaka, H., Ito, T., Yoshimura, Y., Ishida, H. et al. (2013). Mechanism of fluctuation in shear force applied to buttocks during reclining of back support on wheelchair. *Disability and Rehabilitation: Assistive Technology.* 8(3), 220-224.
4. Gilsdorf, P., Patterson, R., Fisher, S. & Appel, N. (1990). Sitting forces and wheelchair mechanics. *Journal of Rehabilitation Research and Development.* 27(3), 239-246.
5. Chae, S. (2012). Comparison of cardiopulmonary function changes during wheelchair propulsion: Backrest angle. *Journal Physical Therapy Science.* 24(4), 355-357.
6. British Columbia Wheelchair Guidelines Working Group. (2014). *Wheelchair provision for children and adults with neuromuscular conditions in British Columbia.*
7. Yang, Y., Koontz, A., Yeh, S. & Chang, J. (2012). Effect of backrest height on wheelchair propulsion biomechanics for level and uphill conditions. *Archives Physical Medical Rehabilitation.* 93, 654-659.
8. Lephart, K. & Kaplan, S. (2015). Two seating systems effects on an adolescent with cerebral palsy and severe scoliosis. *Pediatric Physical Therapy.* 27(3), 258-266.
9. Ukita, A., Nishimura, S., Kishigami, H. & Hatta, T. (2015). Backrest shape affects head-neck

alignment and seated posture. *Journal of Healthcare Engineering.* 6(2), 179-192.
10. Samuelsson, K., Bjork, M., Erdugan, A., Hansson, A. & Rustner, B. (2009). The effect of shaped wheelchair cushion and lumbar supports on under-seta pressure, comfort and pelvic rotation. *Disability and Rehabilitation: Assistive Technology.* 4(5), 329-336.