Clinician's Commentary on Duong et al.¹

The scope of physiotherapy in Ontario was expanded in 2011 to include the authorized act of oxygen titration and administration.² Current standardized clinical decision-making tools for oxygen titration are not specific to physiotherapy interventions. Duong and colleagues' study,¹ which presents a preliminary clinical decision-making tool that considers oxygen requirements during physical exertion, is therefore both timely and clinically relevant. The authors identify factors to guide the user on pre- and post-titration assessment, considerations, and preparatory steps in the acutely ill adult patient. Specific parameters to adjust oxygen flow rates are not suggested in this tool, as panellists were unable to reach consensus. The lack of specific oxygen titration parameters likely reflects multiple factors, including the variety of potential cardiorespiratory limitations and responses, the range of activity levels prescribed during physiotherapy interventions, and the specifics of the oxygen titration order.

Duong defines *acutely ill patients* as those who are at high risk for actually or potentially life-threatening problems and/or those requiring detailed observations or interventions from higher levels of care. This definition can encompass a wide array of medical and surgical populations with a variety of clinical presentations, including people with deteriorating cardiorespiratory status or recovering from an illness or from surgery. Over the past decade, awareness has increased about the deleterious effects of immobilization and deep sedation in the intensive care unit (ICU) on both short- and long-term morbidity.³ Although evidence is emerging for the efficacy and safety of early mobilization to prevent the development of ICU-acquired weakness, no standardized protocols exist either for exercise prescription or for oxygen titration when mobilizing mechanically ventilated and non-ventilated acutely ill patients.⁴ A systematic review on early mobilization reported that transient oxygen desaturation was a common event and was attenuated by rest or by increasing the fraction of inspired oxygen.⁵ In 2008, a task force on critical care recommended appropriate monitoring of vital signs, avoiding aggressive mobilization for patients with high oxygen requirements, and ensuring sufficient respiratory reserve,⁴ but did not provide specific oxygen titration guidelines. Because mobilization strategies are based on the patient's clinical condition and response to treatment, interventions can vary widely to include different modes of activity (bed mobility, active/assisted exercise, sitting, transfers, standing, walking, cycling, resistance exercise) and different frequencies, durations, and intensities, resulting in varying metabolic demands and oxygen requirements.

The physiotherapist's role in oxygen titration extends beyond the acutely ill population to clients with chronic cardiac and respiratory disease. Guidelines for long-term home oxygen funding recognize the effect of physical exertion on oxygen requirements by extending medical eligibility for exertional hypoxemia.⁶ However, the assessment and documentation of exertional hypoxemia is used to confirm eligibility for home oxygen rather than to provide clear guidance on specific flow rates for exertion, and the amount or flow of oxygen adequate for resting does not necessarily meet the oxygen requirements of activities of daily living (ADL), as evidenced by falls in oxygen saturation during ADL in people with chronic lung disease.⁷ For people with chronic

cardiorespiratory conditions, oxygen titration continues throughout the continuum of care. For example, a person with end-stage lung disease who is listed for a lung transplant will undergo pulmonary rehabilitation, with structured exercise training prescribed at sufficient intensity to attempt to achieve physiologic training effects while maintaining adequate oxygenation and tolerable symptoms. Oxygen prescription for exercise training is typically higher than resting or sleeping requirements and may change during the waiting period before transplant in the case of acute exacerbations, infections, or progression of the underlying lung disease. Following lung transplant, mobilization is initiated and progressed throughout the hospital stay, and supplemental oxygen is typically titrated down to room air by discharge. At all phases of care, varying levels of physical exertion are prescribed as cardiorespiratory capacity and medical and surgical management change.

Lastly, inter-professional collaboration is essential. The administration and titration of oxygen requires an order from an authorized professional, and guidelines may vary between facilities and practice areas. Specific procedures for physiotherapists adjusting oxygen flow rates may differ depending on whether the titration order specifies a flow rate (e.g., 2L nasal prongs) or an oxygen saturation range (e.g., keep SpO₂ > 92%). Prescribed oxygen saturation ranges may be lower for patients with existing cardiorespiratory disease and those already on supplemental oxygen. While specific parameters may be challenging to apply in every clinical population and environment, incorporating considerations for physical exertion into a decision-making tool is an important step in guiding oxygen titration in the physiotherapy management of diverse cardiorespiratory conditions.

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