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The effect of penetrating trunk trauma and mechanical ventilation on the recovery of adult survivors after hospital discharge

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ABSTRACT

South Africa has a high incidence of violence and death due to unnatural causes. Gunshot and/or multiple stab wounds to the trunk are consequently injuries commonly seen in South African hospitals. Penetrating injuries often necessitate explorative surgical intervention to identify and treat injuries to the internal organs. Patients are managed in the intensive care unit and frequently return to theatre for abdominal lavage prior to eventual wound closure. Critical illness with prolonged mechanical ventilation and immobilization results in some degree of muscle dysfunction. Survivors of critical illness suffer from poor functional capabilities and decreased quality of life. No formal rehabilitation programmes exist in South Africa for these patients following discharge. *Purpose:* To determine if patients that survived penetrating trunk trauma recover adequately spontaneously following critical illness over the first six months following discharge from the hospital. *Methods:* A prospective, observational study was conducted. Patients with penetrating trunk trauma were recruited from four intensive care units in Johannesburg. Patients who received mechanical ventilation < 5 days were placed in Group 1 and those who received mechanical ventilation ≥ 5 days were placed in Group 2. Lung function tests, dynamometry, quality of life, six-minute walk distance and oxygen uptake tests were performed over six months following discharge from the hospital. The obtained results for dynamometry, exercise capacity and quality of life were compared between groups and to that measured for a healthy (age and sex-matched) control group. *Results and Discussion*: No pulmonary function abnormalities were detected for subjects in Groups 1 or 2. Distance walked during 6MWD test was significantly reduced for subjects in Group 2 compared to the control group [one-month ($p = 0.00$), three-months ($p = 0.00$)]. Morbidity correlated significantly with distance walked by subjects in Group 2 during 6MWD test [three-months ($p = 0.03$), six-months ($p = 0.02$)]. No statistically significant differences were found between subjects during the VO_{2peak} test although subjects in Group 1 performed better clinically than those in Group 2. At one-month there was a significant reduction in upper and lower limb strength for subjects in Group 2 compared to those in Group 1 and the controls ($p = 0.00 – 0.04$). Similar results were detected at the three- and six-month assessments. ICU and hospital length of stay did demonstrate a significant relationship with muscle

strength at one and three months following discharge for subjects in Group 2. Severity of illness and morbidity in ICU did not have a significant relation to muscle strength for subjects in Groups 1 or 2 at any of the assessments. Subjects in Group 1 had a significant reduction in right deltoid and triceps strength compared to the controls at one-month ($p = 0.00$ respectively) only. No significant differences in upper and lower limb muscle strength were detected between the control group and subjects in Group 1 three and six months after discharge. Subjects in both groups had similar limitations in physical and mental aspects of quality of life one-month after discharge. Subjects in Group 1 reported a quality of life comparable to the control group by three-months. Subjects in Group 2 had significant limitations in the physical components of quality of life at three- and six-months compared to those in Group 1 and the controls [$p = 0.00 – 0.02$]. *Conclusion*: Subjects in Group 1 recovered adequately on their own within three months after discharge from hospital with regard to muscle strength, exercise capacity and all aspects of quality of life. Subjects in Group 2 presented with significant limitations in exercise capacity, muscle strength and the physical aspects of quality of life even at six months after discharge. Impaired function was related to the duration of critical illness and immobility. A physiotherapist-led rehabilitation programme may be indicated for survivors of penetrating trunk trauma that received prolonged mechanical ventilation to address cardiovascular endurance and peripheral muscle strength retraining between one and three months after discharge to address the physical disabilities observed in these subjects.