Comparison of activity forces between patients who follow traditional sternal precautions versus those who use a unique post-sternotomy discharge education model: “Keep Your Move in the Tube”

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Introduction

• Traditional sternal precautions, intended to help prevent sternal wound complications, vary widely but generally include arbitrary load and time restrictions (e.g., lifting no more than 5 to 10 pounds for up to 12 weeks). Having observed the negative effects of restrictive sternal precautions for many years, we developed an alternative approach that teaches patients how to perform load-bearing movements in a way that avoids excessive stress to the sternum. Keep Your Move in the Tube, which is based on the ergonomics that shorten the length of the outstretched arm (lever arm reduction), enables patients to perform previously contraindicated activities.

• We undertook a prospective pilot study to compare the force required to lift 10 pounds (the upper limit suggested by current sternal precautions) with the forces exerted by sternotomy patients who practiced Keep Your Move in the Tube while performing a series of practical ADLs.
Anatomical diagram of sternal rewiring post sternotomy, pectoral muscle origin and attachment, and graphical representation of the “Tube” in “Keep Your Move in the Tube” model.
Example of activities of daily living impacted by sternotomy and demonstrations of how to perform them using the “Keep Your Move in the Tube” model.
Methods

- Using the Primus RS, we obtained isometric 1-RM strength measurements from 10 sternotomy patients enrolled in cardiac rehabilitation (7 men and 3 women, aged 41 to 78 years) as they performed the following simulated activities: placing an object overhead, picking up an object from the floor, and opening a door. Afterward, dynamic movements that simulate rising from a bed and rising from a chair were performed three times by pushing against the force dynamometer. One-sample t-tests were used to compare the average force pounds exerted for each of the five activities with 12.5 force pounds (the force required to lift a 10-pound weight).
Results

• The subjects exerted (mean ± SD) 46.9 ± 21.1 force pounds when lifting overhead and 83.9 ± 34.7 force pounds when lifting from the floor. Additionally, they exerted 28.5 ± 13.7 force pounds while pulling a door open, 27.0 ± 7.8 force pounds while rising from bed, and 26.6 ± 14.7 force pounds while rising from a chair. For each of the five simulated activities, the average force exerted by the subjects differed significantly from the force required to lift 10 pounds (p-values: 0.0003, 0.0001, 0.0025, 0.0001, 0.0070 respectively). No adverse events were observed.
Conclusions

• Limiting sternotomy patients to lifting no more than 5 to 10 pounds for 10 to 12 weeks can lead to a cascade of negative events, such as muscle atrophy, depression, delayed hospital discharge, or even job loss. Current sternal precautions do more harm than good, and this issue must be addressed. As with most aspects of medicine and patient care, there is a natural evolution; Keep Your Move in the Tube is the next step.

• This educational model enabled sternotomy patients in this study to lift, pull, and push with substantially more force than would be required for the 10-pound restriction recommended by current sternal precautions. Furthermore, they performed these activities an average of 3 weeks and 3 days after surgery (range, 6–45 days), far sooner than the usual 10- to 12-week restriction.
Cardiac rehab patient preparing to lift object overhead using Primus RS equipment.

Cardiac rehab patient lifting object overhead using the “Keep Your Move in the Tube” model.