Incentive Spirometry - Physiotherapy

UNAVAILABILITY OF INCENTIVE SPIROMETRY AT PROVIDENCE HEALTH CARE

- An evidence-informed approach –

This document provides the evidence supporting the unavailability of incentive spirometers at Providence Health Care.

An incentive spirometer (IS) is a device used to provide visual feedback to a patient in order to encourage deeper breathing. There are two main types: flow sensitive and volume sensitive. In healthy populations, there is little difference in their effect on breathing pattern (Chang et al, 2010) and interestingly, in a randomized trial, postoperative patients who had the visual feedback obscured, took larger inhalations than those who were able to see it (Eltorai et al. 2019). Moreover, adherence may be poor and technique incorrect (Narayanan et al, 2016, Eltorai et al. 2018).

The following is a summary of the conditions / situations in which IS is contraindicated or ineffective:

Contraindicated	Ineffective
• Pneumothorax • Bronchospasm • Acutely low cardiac output • Increased respiratory rate • COPD • Decreased level of consciousness	• Inability to follow commands

There is **evidence demonstrating the lack of additional benefit of IS**:

- On preventing pulmonary complications after upper abdominal surgery:
  - not effective in comparison to those receiving physiotherapy (de Nascimento et al,2014 Cochrane Review).
  - no more effective than deep breathing exercises (Carvalho et al, 2011)
- On preventing pulmonary complications after thoracic surgery:
  - no more effective than other physiotherapy interventions (Agostini et al, 2008;Carvalho et al, 2011).
- On preventing pulmonary complications after cardiac surgery:
  - no more effective than other interventions (Carvalho et al, 2011)
- On lung function for acute exacerbation of chronic obstructive pulmonary disease
  - No more effective than standard care (Tang et al, 2010)
- On improving dyspnea, vital capacity or oxygen saturation with *pneumonia*
  - No more effective than placebo (Moore et al, 2018)

For most patients, **early mobilization and deep breathing exercises are as, or more, effective** than IS in reducing complications of surgery or bedrest (Agostini et al, 2008; Carvalho et al, 2011; Sarkaar & Tamang, 2015).

The American Association for Respiratory Care Clinical Practice Guideline includes the following recommendations regarding IS:

1. IS alone is not recommended in the preop and postop setting to prevent postop pulmonary complications.
2. It is recommended that IS be used with deep breathing techniques, directed coughing, early mobilization, and optimal analgesia to prevent postop pulmonary complications.
   Note: This statement should be interpreted in the context that the use of IS is not being recommended but rather that if it is being utilized it should be used together with other interventions (e.g. deep breathing and mobilization) that have had their effectiveness confirmed.
3. It is suggested that deep breathing exercises provide the same benefit as IS in the preop and postop setting to prevent postop pulmonary complications
4. Routine use of IS to prevent atelectasis in patient after upper abdominal surgery is not recommended.
5. Routine use of IS to prevent atelectasis after coronary artery bypass graft surgery is not recommended.
6. It is suggested that a volume-oriented device be selected as an IS device. (AARC Clinical Practice Guideline: Restrepo et al, 2011)

If a patient has access to a personally acquired IS it is critical to ensure that it is used properly. There are differences in how patients use these devices (Lunardi et al, 2014) and unsupervised patients typically decrease their flow rate which results in lesser chest wall motion than that produced with higher flow rates (Chang et al, 2010). Consequently, if a patient chooses to use an IS, it is important that he/she is instructed and monitored to ensure the correct breathing pattern is utilized to elicit the desired effect.

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