

Incentive Spirometry

In post-surgical patients, how effective is the use of incentive spirometers in decreasing pulmonary complications during hospital stays?

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Introduction

Post-operative respiratory measures aim to promote full lung expansion in order to prevent pulmonary complications; the use of an incentive spirometer can aid in this process (Westwood et al., 2007).

An incentive spirometer is a device used to encourage deep breathing while allowing the patient to visualize the effectiveness of each inhalation.

Common post-surgical complications in patients are atelectasis, pneumonia, hypoxemia, and pulmonary embolisms. Often caused from anaesthesia, analgesics, and patient immobility (Sona, & Fothergill-Bourbonnais, 2014).

According to an article by Dr. K. Westwood, “pulmonary complications are the leading cause of morbidity and mortality following surgery” (Westwood et al., 2007).

Post-Surgical Complications

Atelectasis: The collapse of alveoli due to retained mucous secretions.

- Cause: Inadequate lung expansion due to anaesthesia, analgesia and immobilization of surgical patients prevent full lung expansion.

Pneumonia: An infection in one or both of the lungs. Development in lower lobes of the lung is common in immobilized surgical patients.

- Cause: Poor lung expansion with retained or aspirated secretions.

Hypoxemia: inadequate concentration of oxygen in arterial blood.

- Cause: with respirations depressed by anaesthetics or analgesics, it can increase the retention of mucous.

Pulmonary embolism: an embolus blocking pulmonary arterial blood flow to one or more lobes of the lung.

- Cause: Immobilized surgical patients with preexisting circulatory or coagulation disorders are at a higher risk.

(Sona & Fothergill-Bourbonnais, 2014)

A closer look at the incentive spirometer

An incentive spirometer is a method of encouraging deep breathing.

It is a way patients can visualize their deep breathing and measure their inspiratory volume.

There are two types of incentive spirometers, flow oriented and volume oriented.

1. Flow oriented incentive spirometers consist of plastic chambers containing colored balls that move as you inhale.
2. Volume oriented incentive spirometers have bellows that are raised to a predetermined volume by an inhaled breath. A light is used to provide feedback when the desired level of inhalations is achieved.

It is important that we as nurses understand the proper technique of how to use an incentive spirometer so that we can teach our clients.

(Archer & Harvey, 2014)



How to use an incentive spirometer



(Perry & Potter, 2018)

- Instruct client to sit in an upright position, either on the edge of their bed, in high-fowlers or in a chair.
- Instruct client to exhale fully through their mouth, and then to wrap their lips around the mouthpiece firmly.
- Client is to inhale through the mouthpiece deeply at a slow and consistent pace until they have reached their maximum inhalation.
- Once maximum inhalation has been reached, instruct the client to hold their breath for two-three seconds (if they are able to), then to fully exhale.
- Encourage client to repeat this process 10 times every hour, or as prescribed by physician.
- After explaining this procedure to our clients, it is recommended that we have our clients demonstrate this procedure back to us to ensure they understand the proper technique.

(Perry & Potter, 2018)

Strengths:

- Inexpensive
- Provides visual feedback
- Easy to use
- Helps to exercise the lungs
- Slow steady expansion of the lungs (flow oriented)

Limitations:

- not ideal if patient is nauseated, cognitively impaired or has decreased motor strengths
- Pain
- Improper use is ineffective

From the Research

- In the study “Incentive spirometry decreases respiratory complications following major abdominal surgery”, Dr. Westwood et al. (2007) compared the occurrence of post-operative pulmonary complications (PPCs) with the use of the incentive spirometer (IS) with 117 patients, and without the use of an incentive spirometer with 111 patients.
- The patients had a mean age of 68.
- Independent variable: Incentive spirometer
- Dependent variables: Occurrence of pulmonary complications, and the length of the patients’ hospital stay
- The occurrence of PPCs were 17% in non-incentive spirometer patients vs. 6% in patients using incentive spirometers. Hospital stay lengths were also decreased with the use of incentive spirometers from 4 days without the IS compared to 3 days with the IS. (Westwood et al., 2007)
- Results from this study state that the use of an incentive spirometer decreases the occurrence of pulmonary complications and can also decrease the length of stay for patients.

Conclusion

- Research has shown the use of incentive spirometers is effective in decreasing post-surgical pulmonary complications.
- Expected outcomes are: no crackles in lungs, increased peak inspiratory flow (at least 80% of pre-operative capacity), increased SpO₂ and PaO₂, and improved inspiratory capacity. (AARC, 1991)

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