Incentive Spirometry versus Deep Breathing in Preventing Respiratory Complications

Shannon McGrath and Alexis Marcou

Nursing 611

December 14, 2016
1. PICO Question

Is the use of Incentive Spirometry more effective than Deep Breathing in preventing respiratory complications in post operative patients?

2. Background and Rationale

Postoperative patients are at an increased risk for respiratory complications due to immobilization. Immobilization results in decreased muscle strength of all areas of the body including the respiratory muscles. Patients with diminished respiratory muscle strength are unable to take the deep breaths necessary for complete lung expansion. This inadequate expansion of the lungs can result in alveolar collapse, impaired gas exchange, and pooled secretions. A combination of these factors can lead to respiratory complications such as atelectasis and pneumonia. These conditions pose as a serious threat to an individual’s health and recovery during the postoperative period (Rock, & Rich, 2003).

As a health professional, it is important to implement preventative measures to help patients avoid postoperative respiratory complications. Interventions such as deep breathing and incentive spirometry promote lung expansion and improve gas exchange. These are accessible and effective methods that can be implemented into all patients care plans. Each can be completed independently at the patient’s leisure after prompting and thorough education from the nurse (Rock, & Rich, 2003). With both interventions working to achieve the same outcome, the question arises as to whether one intervention is more effective than the other in preventing atelectasis and pneumonia. Discovering the answer to this question will help eliminate respiratory complications caused by postoperative immobility.
3. Search Methods

We began our search by accessing the UNH library database through the search engine safari. The databases we utilized were accessed through the health and medicine tab under EBSCOhost. These databases included PubMed, CINAHL, and Medline. We used a variety of key-words in order to narrow our results and find relevant articles. These key-words were: Incentive Spirometry; Deep Breathing; Respiratory Complications; Prevention. The limits to our searches included: English only; Abstract Available; Linked full text. We were able to narrow our search by eliminating articles focusing on concepts straying from post op respiratory complications. Using this technique, we located three reliable studies directly addressing our question. As our focus was prevention of specific respiratory complications, we excluded studies discussing the effects of respiratory interventions on ABG measurements and other measurements of tissue perfusion. We specifically focused on articles addressing postoperative patients in the hospital setting. In order to strengthen our conclusion on this topic, we ensured utilizing several types of research methods. These methods included a meta analysis, randomized controlled trial, and systematic overview.

4. Critical Appraisal of the Evidence

The first study we looked at compared the specific effects of deep breathing and incentive spirometry on post op bypass patients. This was a comparative experimental study and involved 32 participants aged 38-68. Participants were assigned randomly to groups with each using either incentive spirometry or deep breathing as respiratory interventions. Both groups received pre operative teaching regarding their postoperative intervention. Pulmonary function tests and ABGs were performed prior to surgery and
post operatively. The study results showed significant differences existing between PaCO2 and PaO2 levels after both interventions. No significant differences were found between the individual methods as to which one was more effective (Mueenudheen, Moiz, & Gupta, 2012).

The biggest strength of this type of study involves the random selection of participants in receiving a particular intervention. Randomized selection produces valid data that is more representative of the population and reduces the presence of extraneous variables on results. Another strength includes the consistent preoperative teaching given to participants, which ensures more accurate and unbiased results. The major weakness of this type of study involves the small sample size. The small sample size was due to the specific surgery studied and because of this, the data may not accurately represent the whole population of post op patients (Mueenudheen, Moiz, & Gupta, 2012).

The second study we looked at compared the effects of lung expansion interventions on post op pulmonary complications. This was conducted as a randomized control trial involving 137 postoperative patients. The participants were randomly assigned into four different groups with each receiving a different intervention. Each group either received no intervention, flow incentive spirometry, deep breathing, or volume incentive spirometry. Each intervention was implemented over five consecutive days after surgery before pulmonary function was assessed. Pulmonary function tests were performed before and after surgery by someone unaware of the interventions each participant received. These tests focused on lung volume, inspiratory muscle activation, and incidence of PPC. The data showed that incidence of PPC was higher in the group with deep breathing as their pulmonary intervention (Lunardi et al., 2015).
The randomized placement of participants into groups posed as a strength to this study as it limits extraneous variables and provides better control over the target population. The uninformed individual assessing the pulmonary complications in participants contributed to unbiased results and increased reliability of the study. Similar to the last study, results may not accurately represent the population as the sample size was limited to a small amount of participants and the study only assessed function in patients post operative of abdominal surgery (Lunardi et al., 2015).

The third study we looked at assessed the effectiveness of incentive spirometry, deep breathing, and intermittent positive pressure breathing on postoperative patients in preventing pulmonary complications through meta-analysis and a systematic overview trial. This method utilizes a combination of specific research studies to draw conclusions. Only studies that met certain criteria were analyzed. This criteria included: a participant group of adults undergoing any type of abdominal surgery; the term “chest physical therapy” included in the study; at least two specific interventions of either incentive spirometer use, deep breathing, or intermittent positive pressure breathing; and the study had to be randomized. In total there were 14 out of 116 studies meeting the criteria. Results from these studies were used to draw conclusions. After a comparison of these studies, incentive spirometer use and deep breathing were found to be significantly effective methods at reducing pulmonary complications. However, no significant differences were found between the three individual methods as to which was more effective (Thomas, & McIntosh, 1994).

This type of study can be considered reliable because the limited criterion in research analysis provides tight control over the population. Only peer-reviewed research
was included in this study. This study may be considered weak in that it cannot be considered a primary source. The data collected was not the result of direct implementation of interventions. This type of research is considered a review and is a secondary source. Although this source may be considered outdated, the intervention techniques remain the same (Thomas, & McIntosh, 1994).

5. Evidence Synthesis

After reviewing the results and conclusions of each of these three trials, we were able to draw our own conclusions on the effectiveness of each respiratory intervention. The first and third study findings were that no significant differences exist between the two interventions. Effects were equal in preventing post op respiratory complications such as atelectasis and pneumonia (Thomas, & McIntosh, 1994; Mueenudheen, Moiz, & Gupta, 2012). The second study concluded incentive spirometry was significantly more effective at preventing pneumonia and atelectasis and more complications arose with deep breathing methods (Lunardi et al., 2015).

Based on the results from all three studies, it is evident that both incentive spirometry and deep breathing are significantly effective in preventing post op respiratory complications. The second study yields different results from the first and third studies in that it shows incentive spirometry to be more effective than deep breathing. The second study also differs from the other studies in that participants were not limited to recovery from specific surgeries (Lunardi et al., 2015). The broader sample size may have contributed to differing results as well. We believe in order to come to an accurate conclusion as to which intervention is more effective, more studies on this topic would need to be analyzed.
6. Clinical and Research Recommendations

In conducting further research, studies should involve the assessment of pulmonary function on a broader range of participants that is not limited to a specific postoperative surgery. This would greatly increase sample size and provide a more accurate representation of the population. Either or both interventions should be implemented into every postoperative patient’s care plan. Due to data showing both methods as effective, patient preference can be considered in postoperative teaching, regarding the use of these interventions between the nurse and patient. In order to help all hospitals come to a common protocol regarding the implementation of a certain preventative measure for respiratory complications, studies on this topic should continue to be researched until a more solidified outcome is achieved. By studying large and more diverse, in regards to types of surgeries and population, more conclusive results will be found.
7. References


