Postoperative Pulmonary Complications (PPCs) following Orthopedic Surgeries

- PPCs are a leading cause of morbidity and mortality, affecting 25%-50% of patients (2).
- Postoperative pulmonary complications (PPCs), defined as respiratory failure, pneumonia, pleural effusion, atelectasis, pneumothorax, or aspiration pneumonitis, are the leading cause for ICU admission, prolonged hospital stay, increased cost, and higher mortality after surgery (4).
- Atelectasis and pleural effusion are also common after total joint arthroplasty, which may adversely affect the outcomes of patients (4).
- Hypoxia after total hip arthroplasty has been reported as a common postoperative complication (5).
- 42% incidence of hypoxemia on postoperative day-1 after total hip arthroplasty (5)
- There is significant difference in the risk of acute respiratory failure in patients with COPD post THR (6)

Benefits of Incentive Spirometry

- IS was first introduced in the early 1970s intending to help prevent Postoperative Pulmonary Complications by encouraging sustained alveolar inflation and maintenance of normal functional residual capacity (1).
- Incentive spirometry (IS) hand-held devices are used postoperatively by surgical patients to achieve effective inspiration. They are designed to mimic natural sighing or yawning by encouraging patients to take long, slow, deep breaths. The IS provides patients with visual or other positive feedback when they inhale at a predetermined flow rate or volume and sustain the inflation for a minimum of 3 seconds. (2)
- Incentive spirometry is widely used postoperatively in the belief that intermittent ventilation restores alveolar aeration and improves oxygenation. (3)
- Maximal lung inflation is thought to open collapsed alveoli and thereby prevent and resolve atelectasis. (3)
- The use of IS decreased alveolar-arterial oxygen gradient, increased PaO2, decreased PaCO2 (3)

Including incentive spirometry during physical therapy treatment to reduce cardiopulmonary complications after Orthopedic Surgeries: Yes or NO

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Question: Are there benefits to including incentive spirometry during physical therapy for reducing cardiopulmonary complications in orthopedic surgical patients?

Conclusion/Clinical Relevance

- Based on the evidence researched, it can be concluded that Incentive Spirometry (IS) can have an effect on some of the potential postoperative pulmonary complications (PPC).
- Currently there are no high quality research studies that look at the usage of IS in patients post-op TKA and THA orthopedic procedures.
- For patients at risk of developing PPCs due to prior disease, it can be hypothesized that IS could be used pre-operatively to help improve inspiratory muscle strength and mechanical ventilation.
- THR is a common orthopedic procedure, the incidence of COPD increases rapidly with age (6).

Further Research

- Randomized Controlled Trials looking to incorporate Incentive Spirometry treatment into early rehab for post operative TKA and THA surgeries.
- Especially in patients with obstructive or restrictive pulmonary conditions.

Levels of Evidence

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References

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