

## Introduction

Breathing exercises, such as diaphragm breathing, has a positive effects in pulmonary functions. The purpose of this study was to assess breathing dysfunctionality symptoms and provide a breathing rehabilitation through an exercise routine. Pulmonary rehabilitation has been shown to improve symptoms, exercise tolerance, and health related qualities.<sup>1</sup>

## Methods

### Breathing Questionnaire

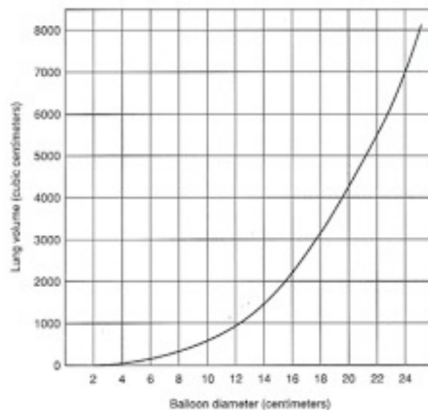
The Self Evaluation of Breathing Questionnaire (SEBQ) consists of 25 questions that are answered on a 3 point scale from (0)never/not true at all to (3)very frequently/very true. The SEBQ was developed to measure respiratory symptoms and breathing patterns to report individuals with breathing dysfunction.<sup>2</sup> The questionnaire was administered to 6 participants (3 females and 3 males) to help me select my individual study.

### Balloon Method

To measure lung capacity, the participant had to use their full expiratory breath into the balloon by forcing as much air as they can in one breath. The volume of air is measured by taking the circumference (cm) and dividing it by 3.14 to get the diameter of the balloon. The volume of air, diameter of the balloon, is the participant's vital capacity.

### Expected Vital Capacity vs. Real Vital Capacity:

To identify the participant's amount of air that can be forcibly exhaled from their lungs, I measured their expected vital capacity. Collecting the participant's body weight (kg) and height (in cm) would provide their body surface area (BSA) to determine the maximum amount of air involved in breathing and receiving oxygen to their lungs. To find the vital capacity, males multiply the BSA by 2500 and females by 2000. The participant is a female, so I multiplied her BSA by 2000. Using the lung capacity (cubic centimeters) vs. balloon diameter (centimeters) will identify the significance difference of their real vital capacity and expected vital capacity.



## Breathing Rehabilitation Program

The participant was administered a breathing exercise routine that took place after her cardio session, rowing and the elliptical for 30 minutes each. The routine consisted of 3 different exercises for a repetition of two and one minute each. The following exercises were:<sup>3</sup>

### The Diaphragm Technique

1. Lie on your back on a flat surface.
2. Place one hand on your upper chest and the other just below your rib cage.
3. Breathe in slowly through your nose, so that your stomach moves out and causes your hand to rise.
4. Tighten your stomach muscles when you exhale through pursed lip breathing.

### Rib- Stretch Breathing

1. Cross your arms over your chest and place palms on either side of your rib cage.
2. Breathe in through your nose until you can't take in anymore air.
3. Feel your ribs expand as you breathe in. Hold breath for 5 to 10 seconds.
4. Breathe out through your mouth.

### Numbered Breathing

1. Breathe in through your nose until you can't take in anymore air.
2. Exhale until air has been emptied from your lungs.
3. Count that as breathe one. Repeat steps 1 and 2 until you reach to 10.

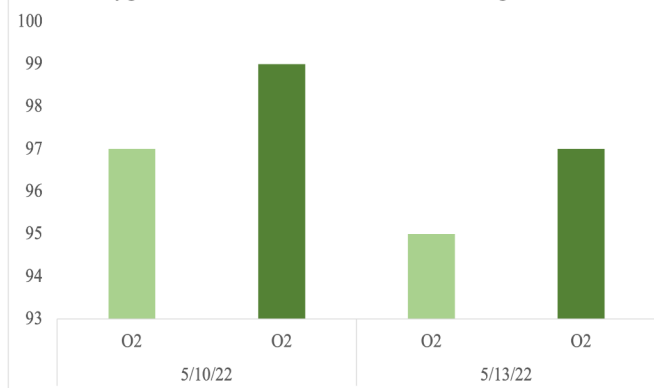
## Research participant

Rose Heston is a female participant at Cardiovascular Wellness Program and she was selected as my individual study due to scoring a high number on the SEBQ which indicated she experiences symptoms correlated to breathing dysfunctionality. Rose has emphysema, a condition in which the air sacs of the lungs are damaged and enlarged, causing breathlessness. Her assessment in SEBQ determines that she will benefit from practicing diaphragm breathing to improve breathing behavior and quality of life.



## Data Analysis

Oxygen Saturation Before and After Breathing Exercise



From the bar graph, there is an increase of 2% of oxygen saturation after the participant practices diaphragm breathing. These measurements were conducted by taking the oxygen saturation before and after the exercise routine.

## Conclusion

For the last assessment, I measured the participant's vital capacity through the balloon method. The results showed that diaphragm breathing did not provide a significant increase in the participants balloon diameter as it stayed the same (15.43 cm). The final questionnaire scored higher than the first self-report questionnaire, but the participant's shows a decrease in scale level. For instance, Rose feels she gets easily breathless out of proportion to her fitness very true, but in the final questionnaire, she indicated that she rarely feels breathless. Therefore, this study did improve Rose's exercise tolerance and improve her breathing dysfunctionality symptoms.

## References

1. Mendes, L., Moraes, K., Hoffman, M., Vieira, D., Ribeiro-Samora, G., Lage, S., Britto, R. and Parreira, V., 2018. Effects of Diaphragmatic Breathing With and Without Pursed-Lips Breathing in Subjects With COPD. *Respiratory Care*, 64(2), pp.136-144.
2. Courtney, R., Greenwood, K. and Cohen, M., 2011. Relationships between measures of dysfunctional breathing in a population with concerns about their breathing. *Journal of Bodywork and Movement Therapies*, 15(1), pp.24-34.
3. Jewell, T. and Hoshaw, C., 2022. *Diaphragmatic Breathing: Exercises, Techniques, and More*. [online] Healthline. Available at: <<https://www.healthline.com/health/diaphragmatic-breathing#steps>> [Accessed 20 May 2022].

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