Inhaler Education to Prevent Chronic Obstructive Pulmonary Disease and Asthma Exacerbations

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Introduction

Purpose

- To develop an educational program that will inform patients and healthcare providers about the importance of proper inhaler use and the impact of education on COPD and asthmatic patients' ability to recognize risk-triggering exacerbations resulting in deteriorating lung function (Klijn et al., 2017)
- The project aims to demonstrate an improvement in inhaler adherence for COPD and asthma patients with frequent ED visits and hospitalizations secondary to exacerbations (Chrystyn et al., 2017: Klijn et al., 2017)
- Video-based inhaler instruction will be followed by the teach-back method (Shah & Gupta, 2017). The measurement of symptom assessment and quality of life will be evaluated using the Modified Medical Research Council Dyspnea Scale (mMRC). The Test of Adherence (TAI) questionnaire will evaluate improved knowledge and medication compliance about various inhaler device types after educating on proper inhaler technique and usage (Muneswarao et al., 2021).The COPD Assessment Test (CAT) and the Mini Asthma Quality of Life Questionnaire (Mini AQLQ) will both evaluate the disease-specific state of health and quality of life in terms of a health measurement (Munari et al., 2018)

Background and Significance

- Pulmonary diseases are a leading cause of death worldwide (Chrystyn et al., 2017; Jansen et al., 2021)
- COPD hospitalizations cost over 13 billion dollars annually; (Jansen et al., 2021)
- Nearly 22 to 78% of COPD and asthma patients are nonadherent with inhaled therapy (Jansen et al., 2021).
- Exacerbations due to improper inhaler use and technique lead to frequent emergency department (ED) visits and hospital readmissions (Panozzo, 2018)
- Each time the inhaler technique is performed improperly, it is deemed a critical error and results in poor medication delivery to the lungs (Panozzo, 2018)
- There is no outpatient inhaler educational program to assist patients with the importance of proper usage and technique to prevent exacerbations or worsening of COPD and asthma

Methods

Setting

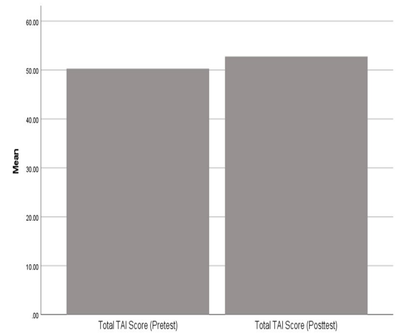
- Outpatient pulmonary clinic in Germantown, which is one of the suburban municipalities adjacent to Memphis, Tennessee

Sample

- A quantitative descriptive correlation design consisting of 50 males and females ages ranging from 35 to 80 years old
- Diagnosis of COPD or asthma, prescribed at least one inhaler device
- Frequent ED visits or hospitalizations within one year
- Tools utilized consisted of the Test of Adherence to Inhaler Questionnaire (TAI), COPD Assessment Test (CAT), Mini Asthma Quality of Life questionnaire (Mini AQLQ), Modified Medical Research Council Dyspnea Scale (mMRC), and an inhaler educational video with teach-back method (Munari et al., 2018; Muneswarao et al., 2021; Shah & Gupta, 2017)
- TAI, CAT, Mini AQLQ, and mMRC questionnaires will be completed by each participant. The self-reporting TAI questionnaire and CAT will be completed on the initial visit and repeated within four weeks
- Following completion of the initial TAI, CAT, or Mini AQLQ and mMRC dyspnea questionnaire forms, an inhaler educational video will be viewed. A teach-back counseling session with the provider will be performed with each participant
- After four weeks, repeat completion of the TAI and CAT tools
- Primary tools utilized to signify the effectiveness of the inhaler education were the TAI and CAT. The TAI score should increase by 3 points, and the CAT score should decrease by 2 points, denoting the efficiency of inhaler education (Munari et al., 2018)
- The ED visits of the same participants will be compared and analyzed within a 3-month time
- Scores from the questionnaires were computed, totaled, and entered into SPSS for analysis.

Results

- Hypotheses were assessed with paired t-tests difference between the average pretest and posttest TAI scores, CAT scores, and errors of pressurized meter dose inhalers (pMDIs) and dry powder inhalers (DPIs)
- Pretest TAI score was 50.28 (SD = 3.45), and the average posttest TAI score was 52.76 (SD = 1.84), indicating a mean difference of 2.48. The difference between the scores was statistically significant ($t(20) = 3.38$, $p < .05$). The null hypothesis was rejected
- Pretest CAT score was 19.33 (SD = 9.81), and the average posttest TAI score was 16.91 (SD = 8.65), indicating a mean difference of 2.42. The difference between the pretest and posttest CAT scores was not statistically significant ($t(11) = 0.98$, $p > .05$). The null hypothesis was accepted
- pMDIs mistakes at the pretest was 0.28 (SD = 0.78), and the average number of pMDIs mistakes at the posttest was 0.19 (SD = 0.67), indicating a mean difference of 0.09. The difference between the mistakes at the pretest and posttest was not statistically significant ($t(20) = 0.56$, $p > .05$). The null hypothesis was accepted
- Number of DPIs errors at the pretest was 1.14 (SD = 1.27), and the average number of DPIs errors at the posttest was 0.19 (SD = 0.51), indicating a mean difference of 0.95. The difference between the scores was statistically significant ($t(20) = 0.56$, $p < .05$). The null hypothesis was rejected
- ED visits of the same participants were compared and analyzed within three months. The change in ED visits was assessed with the Wilcoxon signed ranks test
- Wilcoxon signed-rank test was used to assess the differences in ED visits at pretest and posttest. Wilcoxon signed-rank test showed there was no statistically significant change in ED visits from pretest to posttest ($z = -1.00$, $p = .31$), and the percentiles of ED visits at pretest and posttest were the same
- Indeed, most patients indicated no ED visits at pretest (80%) and posttest (84.2%), but the intervention did not have a statistically significant impact on ED visits from pretest to post test



Mean TAI Scores Pretest and Posttest

Conclusions

- Instituting educational methods improved proper inhaler technique and usage, demonstrating the need for an inhaler educational program
- Results of TAI scores, CAT scores, and inhaler device mistakes demonstrated that there is a need for an outpatient inhaler educational program
- Proper inhaler usage demonstrated improvement in posttest results which helps patients better manage symptoms of COPD and asthma
- There was no statistically significant difference seen in the number of ED visits; however, the majority of patients revealed no ED visits at post test

Recommendations

- More research needs to target how medication adherence and training can impact hospital readmissions and ED visits. Proper inhaler use and technique may prevent ED visits, which showed a slight decrease in the study but was not statistically significant.
- Consider future research to examine ways to improve errors or mistakes among pMDIs and DPIs to uncover some understanding of why this difference might exist
- Additional research should be conducted to examine reasons for the CAT pretest and posttest item scores

Implications for Practice

- COPD and asthma, if effectively treated, can be managed in the outpatient setting
- Implementing an inhaler educational program for COPD and asthmatic patients fostered with the knowledge of proper inhaler use and understanding of the disease process could be favorable for all involved stakeholders
- Ideal outcomes will assist in increasing staff confidence, improving relationships between the provider and patient, increasing patient medication adherence, improving quality of life, and ultimately reducing ED visits or hospital readmissions due to exacerbations

Bibliography

1. Chrystyn, H., van der Palen, J., Sharma, R., Barnes, N., Delafont, B., Mahajan, A., & Thomas, M. (2017). Device errors in asthma and copd: Systematic literature review and meta-analysis. npj Primary Care Respiratory Medicine, 27(1). https://doi.org/10.1038/s41533-017-0016-z
2. Jansen, E. M., van de Hei, S. J., Dierick, B. H., Kerstjens, H. M., Kocks, J. H., & van Boven, J. M. (2021a). Global burden of medication non-adherence in chronic obstructive pulmonary disease (copd) and asthma: A narrative review of the clinical and economic case for smart inhalers. Journal of Thoracic Disease, 13(6), 3846–3864. https://doi.org/10.21037/jtd-20-2360
3. Klijn, S. L., Hiligsmann, M., Evers, S. A., Román-Rodríguez, M., van der Molen, T., & van Boven, J. M. (2017). Effectiveness and success factors of educational inhaler technique interventions in asthma & copd patients: A systematic review. *npj Primary Care Respiratory Medicine*, *27*(1). https://doi.org/10.1038/s41533-017-0022-1
4. Munari, A. B., Gulart, A. A., dos Santos, K., Venâncio, R. S., Karloh, M., & Mayer, A. F. (2017). Modified medical research council dyspnea scale in gold classification better reflects physical activities of daily living. *Respiratory Care*, *63*(1), 77–85.
5. Muneswarao, J., Hassali, M., Ibrahim, B., Saini, B., Naqvi, A., Hyder Ali, I., Rao, J., ur Rehman, A., & Verma, A. (2020). Translation and validation of the test of adherence to inhalers (tai) questionnaire among adult patients with asthma in malaysia. *Journal of Asthma*, *58*(9), 1229–1236.
6. Panozzo, G. (2018b). An intervention to reduce medication noncompliance and hospitalizations. *Home Healthcare Now*, *36*(1), 34–42. https://doi.org/10.1097/nhh.0000000000000628
7. Shah, R. F., & Gupta, R. M. (2017). Video instruction is more effective than written instruction in improving inhaler technique. *Pulmonary Pharmacology & Therapeutics*, *46*, 16–19. https://doi.org/10.1016/j.pupt.2017.08.005