**Non Compliance of Inhaler Usage in Respect of Maintenance and Management of Asthma**

The identified suitable problem area that requires exploration according to my personal area of professional practice is management of asthma through the adoption of good inhaler adherence practice. Inhaled therapies remain the most successful and effective approach to the management of asthma and other obstructive lung diseases. The inhaler therapies work by delivering agents directly into the lungs with an aim of offering patients relief in terms of triggering a rapid series of action that ease breathing while at the same time reducing the side effects associated with asthma treatment. It is also important to note that proper management of the disease requires that the patient has full understanding and knowledge about the disease and the optimal administration of the therapies. The patients’ understanding of the best inhaler technique also plays a central role in optimising the administration and dispensation of the doses.

Evidence shows that even patients who have full knowledge about the disease, have accepted their treatment, and have already started the treatment need to learn how to implement the inhaler therapies correctly. This is because such knowledge in required for optimal delivery where the right volume of therapy dispensed from the inhaler device is able to reach its target during therapy administration, and in the process, thereby achieving the appropriate breath control. Given the different type of inhaler technique including the coordination, priming, positioning, breath control and inspiratory flow rate, these techniques complicate the treatment process and limit the ability of the patient to master the management and maintenance of asthma. In this case, poor inhaler technique and inadequate inhaler instruction should be at the cornerstone of asthma management and maintenance.

**Rationale for Selection of this Problem Area**

The rationale for addressing this research topic is based on the account that, despite the effectiveness of the inhaler therapies in helping asthma patients manage the condition, there has been many complications about poor inhaler adherence, which has resulted in increased complains about the efficiency of these therapies in helping patients deal with the management of asthma. Non-adherence to treatment and poor inhaler techniques have been blamed for the major issues in the control of asthma as it is reported that between 72 and 83 percent of the people with asthma do not use their devices properly in a way that improves their condition (Azzi et al., 2017). Moreover, Braido et al (2016) explain that part of the problem is that patients are not using the inhalers properly as they are instructed to do. The failure to adhere to the specific manner in which these intervention is prescribed results in significant consequences, including poor asthma control, and reduced clinical outcomes.

A wide coverage of the existing literature point to the fact that patients can benefit immensely from improved adherence to the management of the disease if they have adequate knowledge about the disease and how to control it. However, there is consistent failure in the awareness as patients are increasingly reported to suffer from effects of non-adherence to asthma medication and poor inhaler techniques. Some of the barriers to effectiveness of inhaler therapies include patient-related issues, economic, system-related, therapy-related, condition-related and others including social and psychological reasons. Understanding how these factors affect the adherence to medication and inhaler technique are key to determining how well patients can improve their disease management practices.

One of the ways in which patients can understand the disease, its pathology, factors limiting their success to control the condition and how to effectively adhere to medication and good inhaler technique is through the use of multidisciplinary educational programs and training. With education, the patients will slowly and continuously learn to make the best decisions when it comes to best practice for the management of asthma using the inhaler technique.  A search for evidence was utilised as the most practical method of generating the best evidence-based research to help inform this problem area.

**Search Method**

The CINAHL database was used to search for information as it is the largest source of information for nursing research related to all factors related to evidence-based practice. The search for evidence on information required to address the research on failure of patients to maintain and manage asthma as a result of noncompliance of inhaler usage. The search keywords used in the search for research include ‘non-compliance,’ ‘inhaler usage,’ ‘maintenance and management of asthma,’ and ‘asthma.’ Using filters to narrow down the search results involved using the filters of date of publication, and relevance. In this case, only article published in the last five years were considered for inclusion in this reflection.

The criterion for relevance was very important in searching for evidence as it was fundamental in ensuring that the research question was addressed adequately. The results of the search resulted in 7 articles; ranging from randomised controlled studies, qualitative studies, and quantitative studies. From these studies, a randomised controlled study conducted by Basheti et al. (2017) was selected as it adhered to all the inclusion criteria, primary the concept of relevance and currency. Moreover, since the article has a level 1 quality, it was considered to be the best in addressing the research topic and yielding the best insights for the evidence-based practice.

The Cochrane Library was also used to search for evidence to ensure that only the highest level of evidence was used in the study. The Cochrane Library was considered as it is the largest collection of high level nursing evidence including meta analyses, reviews of evidence and systematic reviews. According to the American Association of Critical Care Nurses (AACN), systematic reviews have the highest level of nursing evidence and are ranked as the highest quality nursing research with level A quality. The same keywords were used in the search of research evidence as used in the CINAHL database. One systematic review was selected for inclusion in this study by Klijn et al. (2017).

These two studies were selected to address the research topic as they are not only high quality research, but they are nursing evidence that is primarily aimed at addressing specific healthcare issues related to nursing. As such, the research provided herein has important implication in shaping evidence based practice in nursing which is aimed at improving patients’ compliance to the use of inhalers, hence improving the clinical outcomes of patients with asthma.

**Effect of novel inhaler technique reminder labels on the retention of inhaler technique skills in asthma: a single-blind randomized controlled trial’ by Basheti et al. (2017)**

Basheti et al., (2017) conducted a single-blind randomized parallel-group active-controlled study with a sample of ninety-five patients. The patients were enrolled in two inhaler techniques accuhaler (n=54) and turbuhaler (n=45). The two groups were then randomly assigned into the intervention and control groups. The accuhaler intervention group had 28 patients while the control group had 26 patients, the turbuhaler technique had 23 patients in the intervention group while the control group had 22 patients. The intervention was conducted over a period of 3 months.

Another important approach in which the researcher demonstrates credibility is through the adoption of single-blind randomization. Recently, single-blind randomized studies have attracted a lot of attention in nursing research due to their ability to help clinical researches improve the accuracy and credibility of their results, especially in a research such as this one where primary outcome measures could be easily influenced by the knowledge of the patient that they are being watched (Misra, 2012). This study adopted a single-blind research technique as there was need to adhere to research ethics where the researcher needed to inform the patient about the current research on asthma management. However, the researcher did not inform the patient about the investigation on inhaler technique using the blinding strategy in RCT studies is essential for healthcare organisations and policy makers in the healthcare industry as the results findings from evidence-based research results in the level of reliability and validity that can be trusted. Moreover, with the increase in the attention related to improvement of patient adherence to medication and proper inhaler technique, Basheti et al. (2017) contributes immensely to the growing evidence-based research to help determine the best practice and involvement of patients in practical approaches that would improve their adherence to medication and proper inhaler techniques.

The adoption of randomised control trials in research cannot be underestimated in terms of heling policy makers improve the healthcare sector with unbiased and reliable research findings. In the current study, randomised limits the ability of the study participants and the researchers to influence the study results due to the random enrolment of the patients in the two inhaler technique groups (accuhaler and turbuhaler). After that, another randomisation takes place in the assignment of the subjects into the intervention and control groups. Given that the total of 95 subjects are randomly divided into four groups using a computerised list. To increase the validity of the study results, both the control and intervention groups in both inhaler techniques received education on proper inhaler techniques, but only the patients in the intervention group were actively involved in both education and reminder labels to help them manage the asthma. Both groups participated in the inhaler technique counselling service where the researcher went through the device-specific checklist with the patients in identical educational methods. The ‘show and tell’ technique was aimed at educating the patient on the correct way to use the inhaler. In the active group, the researcher actively engaged the patients to a point of labelling using a highlighter pen the items in the checklist that the subjects got incorrect. As such, the patients in the active group were more actively involved in looking out for the mistakes they did so as to improve on their weaknesses. As such, the researcher was sure that the difference in the efficacy of inhaler techniques in the management of asthma in the active group could only be attributed to the inhaler labelling technique which was present in the active group and absent in the control group.

Given that the study itself was a randomised control trial, the American Association of Critical Care Nurses (AACN) levels of evidence ranks it at a level B. According to Armola et al. (2009), this high level of ranking is based on the fact that randomised control trial studies are well designed control studies that seek to produce research findings that support a specific intervention. The results of this study reported that the use of the ‘Inhaler Technique Label’ was reported to have significant influence in the asthma management and maintenance as the patients in the control group adopted proper inhaler techniques. At the beginning of the intervention, patients in both groups recorded low scores in terms of inhaler techniques, but after three months, both groups had reported an increased level of adherence to the inhaler techniques. While there no significant difference between the two groups during assessment at three months, follow up after three months reported that inhaler technique decreased significantly in the control group than in the active group. The results of this analysis are consistent with Armola et al. (2009) ranking of evidence as it shows that, despite the fact that randomised control studies may only show less than significant differences between the control and intervention groups, the use of follow up assessment can reveal even more significant differences between the two groups. In this case, the intervention (‘Inhaler Technique Label’) demonstrated to result in persistent results in terms of proper inhaler technique even when there was no significant difference between the two groups immediately after intervention.

**Effectiveness and success factors of educational inhaler technique interventions in asthma & COPD patients: a systematic review’ by Klijn et al. (2017)**

Klijn et al. (2017) carried out a systematic review of randomised control trial studies utilising 39 studies with a total of 56 intervention groups in order to assess the effectiveness and success factors of educational inhaler technique intervention in asthma & COPD patients. This systematic review utilized databases from Embase, Medline, and CINAHL mainly targeting studies with a design of randomised control trials that mainly focused on educational inhalation technique interventions. This study was consistent with the RCT study by Basheti et al. (2017) as the main motivation of the review was influenced by the fact that bronchodilators and corticosteroids are very vital in maintaining and disease control in asthma and chronic obstructive pulmonary disease (COPD). Deliver of these drugs are mainly achieved through inhalers that can either be nebulisers, pressurised metered dose inhalers (pMDIs), or dry powder inhalers (DPIs). Nonetheless, majority of the literature are in concurrence that all the inhalers have the capability of effectively delivering the medication, but the mode of delivery can make the difference between poor and proper inhaler technique. The outcome was categorised into two main classes: the studies that reported the number of correct technique, and the studies that reporting the percentage of patients with a correct technique. The primary problem stemmed from the concern that the majority of the patients have the propensity of making inhalation errors, and this might worsen the medical condition of the patient that can sometimes lead to hospitalization. Moreover, the fact that there are limited educational interventions as well as emergence of new inhaler and health insurance policy driven inhalers switches makes educational inevitable. Therefore, it is this fact that Klijn et al. (2017) conducted a systematic review of randomized control trials to investigate the importance of education for the purpose minimizing inhalation errors.

According to the American Association of Critical Care Nurses (AACN) levels of evidence, systematic reviews are ranked at level A evidence as they are perceived to be the highest quality level of evidence in evidence-based practice (Armola et al. 2009). Unlike Basheti et al. (2017) who conducted one study hence ranked at level B, this systematic review ranks the highest because it featured 39 RCT studies with the highest level of quality evidence. In this light, this systematic review performed an inclusion eligibility, quality appraisal, and data extraction from two independent reviewers. The results, from an inclusion perspective, the literature search yielded a total of 1393, however 862 out of 970 articles were excluded based on title and abstract whilst 69 articles were excluded in the process full-text screening. Initial agreement that pertained the reviewers on aspect of eligibility was 87% (Cohen’s k=0.72). Nonetheless, the authors settled on 39 articles that dated from the year 2001. The 39 studies focused had a total of 56 intervention group. The sample sizes of these studies ranged from 10 to 1316 with a median of 60 participants. 89% of all the identified intervention had a physical or video demonstration of inhaler use, but physical demonstration was most common. The article reviewed indicted that the form of demonstration did not have any positive impact on the improvement of inhaler technique over baseline.  Majority of the studies (90%) seemed to be in consensus that there is a significant improvement in inhaler technique after intervention.

A regression analysis was carried out to ascertain the characteristics contributing to improvement of inhaler technique. The regression model indicated that 37 out of the 39 interventions included (95%) indicated statistically significant improvement of inhaler technique. Nonetheless, the review indicted that the average follow-up time was relatively short (5 months), the regression model also indicated that 28% lacked clinical relevant and there cost incurred was not rational. Additionally, poor initial technique, the frequency of inhalation procedure steps, setting (outpatient or inpatient), and the time that elapsed after intervention indicated that there was no any significant impact on the intervention. This is what accounted for the 91% of the effectiveness variation. Other factors such as disease (chronic obstructive vs. asthma), education group size (individual vs. group training) and the type of inhaler have no significant role. Nonetheless, intervention in adults seems to be more effective as compared to children, but intervention effect seems to diminish over time. Therefore, the study concludes that educational intervention to improve inhaler technique was only effective in the short-term. The authors recommended that there should be periodical intervention reinforcement.

The fact that educational interventions are only effective in the short term makes it more perplexing regarding the effectiveness of education. the results of this study are consistent with those held by Basheti et al. (2017) who found that the patient go back to the bad practices of the inhaler use after some time even after the expiry of the education intervention. Therefore, there is need to develop an educational intervention strategy that takes into consideration follow-up processes. In this light, Basheti et al. (2017) recommends the ‘Inhaler Technique Label’ as the most effective education intervention as it was reported to have more lasting impact on good inhaler technique on asthma patients. All the patients, both children and adults should be given an education that will influence their behaviour, and this implies that their practice and adherence to the usage of the inhaler will be more influenced by the behaviour change. The follow-up period should be aimed to ensure that behaviour is changed to adopt to the best inhaler technique. Moreover, the fact that adherence and bad practices were more common among the children indicate that special education should be given to children. The children should be guided more either by their guardian or parents to ensure that they use the inhalers the right way. The fact that inhalation steps was a major factor that influenced effectiveness of the intervention from majority of the educational intervention program indicate that simplification of the steps should be considered if any education intervention program was to be made effective. The follow-up time should also be increased significantly, and it should be based on the age of the individual using the inhaler.

However, Klijn et al. (2017) acknowledged that the review has some strengths and limitations. The major strength of the review is that there are very limited reviews on educational inhaler technique intervention in asthma and COPD patients, and therefore the systematic review provides a definitive evidence on their effectiveness and success factors. Nonetheless, the study was limited to RCTs and therefore it excluded important observational studies. Moreover, there other limiting factor is that there were a wide variety of interventions and outcome measures, and this hampered the performance of the Meta analysis. Nonetheless, despite the shortcoming of this review, majority of the findings can be used to advance evidence based practice to improve the use of inhalers among the patients with asthma and COPD. The major factor that should be considered as deduced from the systematic review of Klijn et al. (2017) is that educational interventions on inhaler technique on asthma and COPD patients are only effective in the short-term. Therefore, more studies should be carried out to ascertain the manner that the education intervention on inhaler technique in asthma and COPD patients can be effective in the long term.

There was consistency in the conclusion reached by both studies. Basheti et al. (2017) and Klijn et al. (2017) reported that type of intervention and duration, individual and group based factors did not have any implication on the patients’ mastery of the proper inhaler techniques. Klijn et al. (2017) concludes that these conclusions should be taken into serious consideration by policy maker in the health sector. This is because a sound health-economic decisions in clinical practice, which is less time-consuming and intervention that are group-based can be selected and the effectiveness would still be optimal. Evidence shows that basing the education intervention on the disease does not help to improve the effectiveness on the education regarding the use of the inhaler (Azzi et al. 2017; Basheti et al. 2017; Braido et al., 2016; Foster et al. 2014; Klijn et al., 2017). As such, it is evident from this reflection that the education intervention programs should be directly related to the technique of using the inhaler and be should not be short term. The intervention should also not take into great consideration the type of inhaler, and this is because majority of the literature suggest that the type of inhaler on educational intervention have no significant effect (Azzi et al. 2017; Basheti et al. 2017). In this regard, individual patients should be given the opportunity to choose the inhaler that they are comfortable with. Moreover, the reflection recommends that it would be prudent to educate patient on their inhaler rather than switching inhaler. All this observations and assertions deduced from the systematic review by Klijn et al. (2017) and RCT study by Basheti et al. (2017) are very insightful in formulating and implementing an educational program that is both effective and efficient.

**Recommendations for Evidence Based Practice**

The two articles by Basheti et al. (2017) and Klijn et al. (2017)are vital pieces of evidence-based research valuable in giving comprehensive and reliable recommendation for evidence based practice. The two articles conclude that inhaler technique can be corrected through effective and persistent education or training, which is important in regards helping patients improve their inhaler technique. The main issue is that majority of asthma patients that use inhalers do not use the inhaler properly, and this limits the effectiveness in the medicine or management of asthma. Therefore, the main question that should be considered for EBP is: How can education intervention be modified to improve inhaler technique? Majority of the evidence available from both the articles indicate that there are some factors that inhibit the usage of the inhaler. Education as intervention method to improve inhaler technique has been found to improve the condition of the asthmatic patient significantly. However, there are some factors that should be considered such as the age and the period of follow up.

This aspect is very relevant and useful to clinical practice, and this because it can be used to formulate an educational intervention method that takes into consideration all the factors that can limit effectiveness of inhaler technique. For instance, the fact that the training or education is only effective in the short term, implies that there is need to increase the follow up period. The follow up period should be increased to make sure that there is permanent change in behavior. The advantage of doing this is that the asthmatic patient’s inhaler technique will be improved and this will imply that asthma management will be improved, and consequently the quality of life of the patients. Increasing the follow up period is very vital as it implies that the patient will have the opportunity to learn permanently the good practice regarding inhaler technique.

Moreover, the patient and the nurse or caregiver will have an improved relationship, which is fundamental in medication compliance. Nonetheless, the main issue to be considered for evidence based practice (EBP) is ensuring that the education intervention is not short term by taking measures such as increasing the follow up time. Moreover, patients can be actively involved in the labelling of the inhaler technique in order to ensure lasting effects of the intervention (Basheti et al., 2017). Thus, poor inhaler technique and inadequate inhaler instruction should be at the cornerstone of asthma management and maintenance. Proper management of asthma will only be greatly achieved of the asthmatic patient is properly using the inhaler. Despite the fact that it has been ascertained that educational intervention is a very vital technique of improving inhaler technique, the intervention’s effectiveness is short lived. Therefore, the main focus is to ensure that the intervention technique is formulated in such a manner that it has completely changed the behavior of the user. Therefore, the follow up period should be long enough to ensure that the asthmatic patient has adapted the best inhaler technique. This is due to the fact that the major problem that has been associated with training or education is that its effectiveness is short term.

This portfolio has allowed to understand better the reason why education and training on inhaler technique does not result in the desired effect despite the documented benefits. The review of the two studies indicated that despite the fact that a patient might have comprehensive knowledge regarding the disease and accepted their treatment, there is an enormous need to learn how to improve their inhaler technique through persistent learning and multifaceted training. Improving their inhaler technique will imply that drugs that are mainly administered by the use of inhalers are effective and help the patient manage asthma and maintain improved clinical outcomes.

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