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**The Implementation of Valsava Manuever on Pain Reduction During IV  
Cannulation : A literature review**

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e-mail : [anggiardi24@gmail.com](mailto:anggiardi24@gmail.com)**Abstract**

Intravenous cannulation is one of the most commonly performed invasive procedures in clinical practice. Inserting a cannula into a vein is a routine procedure, which in some patients may none the less cause discomfort. It can cause significant pain and also distress. Valsalva maneuver is non-invasive, non-pharmacological and effective method to reduce pain. The purpose of this literature review is to get an overview of the implementation of valsava manuever on Pain Reduction During IV Cannulation based on empirical studies in the last ten year. The method used in the search for articles is based on the period 2013-2022 through searches from databases such as Pubmed, Proquest, Ebsco, Sciencedirect, google scholar and CINAHL There were seven articles used for the review of this paper. The result indicate that valsava manuever effective in reducing the pain in patients undergoing intravenous cannulation. Valsalva maneuver can be incorporated by nurses as a measure of pain relief among patients receiving intravenous cannulation.

Keyword : pain, itravenous cannulation, valsava manuever

**Introduction**

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or describe in terms of such damage. (Smeltzer, Bare, Hinkle, & Cheever, 2011). Despite pain-related position statements and the recommendation of the American Pain Society that pain should be assessed by health care providers (HCPs) as a 'fifth vital sign' (Gordon, Dahl, Miaskowski et al, 2005).

Many medical procedures at the hospital used to assess and treat patients can cause pain and also distress at the same

time. Examples such as intravenous (IV) cannulation, blood draws, heel lances, lumbar punctures (LPs), urethral catheterizations, wound repair, and medical imaging of fractures and dislocations (Friedrichsdorf, Postier, Eull, et al, 2015).

Intravenous cannulation is one of the most commonly invasive procedures either in hospital or clinical practice (Agarwal, Sinha, Tandon, Dhiraaj, Singh, 2005). Inserting a cannula into a vein is a routine procedure, which in some patients may none the less cause discomfort (Speirs, Taylor, Joanes & Girdler, 2001). This procedure is a common experience

for more than thousands of patients and reported by adults to be painful for them (Moore, Straube & McQuay, 2009).

Pain motivates the individual to draw from damaging situations and to avoid similar experience in future. Untreated pain has short and long term negative experience and respons for patient and make avoidance for health care in the future (Ali, McGrath, Drendel, 2016). Inadequate pain relief is not only unpleasant for patients but may cause anxiety about further treatment and deter patients from seeking medical care in the future (Bond et al, 2016).

The result of Christian & Sharma (2018) in India revealed that in simple IV cannula majority of the participants 25 (83.3%) were having moderate pain, 5 (16.7%) were having mild pain and the mean pain score is 4.3. Result from Bourbonnais and Tousignant (2012) show us that 12% of patients report about mild to moderate levels of pain during needle insertion and extraction.

Insertion of intravenous cannulation is often complicated in patients who are afraid of needs or have had negative experiences. It is strange that evidence-based practice to be unusual towards practice like intravenous cannulation (Agarwal, Dhiraaj, Kumar, Singhal & Singh, 2006).

During intravenous cannulation the patients may felt moderate to severe pain. Nurses care for clients in many settings and situations in which interventions are provided to promote comfort. A variety of nursing comforts are basic to client need for which nursing care is delivered (Vijay, 2013).

Non-pharmacological nursing interventions are especially important because they can be used in any setting are

cost effective and Valsalva maneuver is one of these measures. Valsalva maneuver is non-invasive procedure, non-pharmacological and also effective to reduce pain when inserting peripheral intravenous cannulation at the patient. Nurses should practice Valsalva maneuver for patients undergoing venipuncture (Ravneet, Preksha, & Rupinderjeet, 2015).

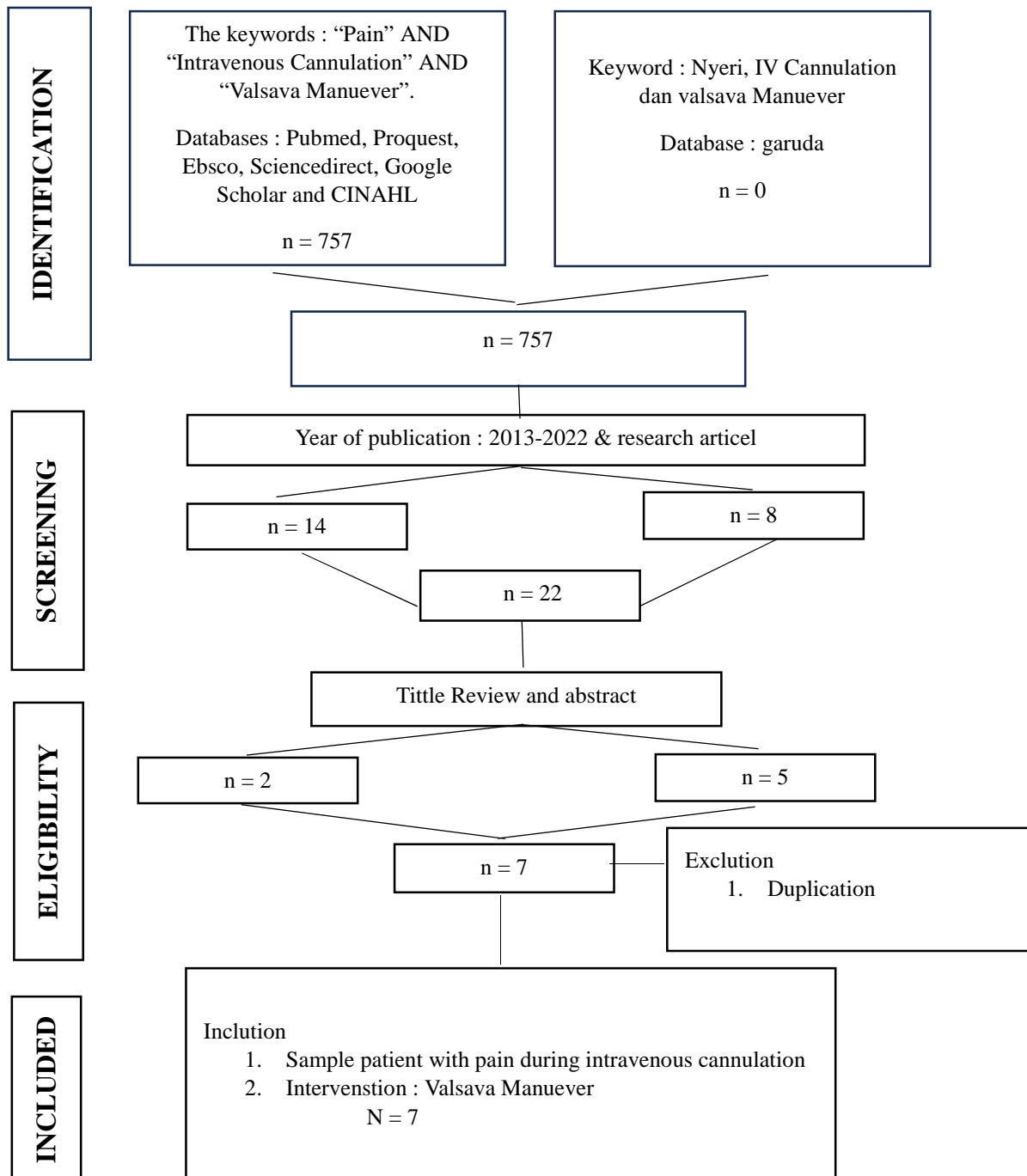
The purpose of this literature review is to get an overview of the implementation of valsava manuever on Pain Reduction During IV Cannulation based on empirical studies in the last ten year.

### Research Methodology

The method used in the search for articles is based on the period 2013-2022 through searches from databases such as Pubmed, Proquest, Ebsco, Sciencedirect, google scholar and CINAHL. Search for articles using keywords or keywords (AND, OR NOT or AND NOT) which are used to broaden or specify searches so that it makes it easier to determine which articles to use.

The keywords used in the search for articles in this study were "Pain" AND "Intravenous Cannulation" AND "Valsava Manuever". With inclusion criteria Articles published for less than ten years (2013-2022), in English, Fulltext. Exclusion criteria included articles that did not follow the purpose of writing EBP and articles that did not use valsava manuever to intervene in pain during IV cannulation. This literature review aims to determine the effectiveness of valsava manuever on pain reduction during IV cannualtion.

The final result of the article search is seven articles analyzed in this paper. The flow of the search for the article can be seen in Figure 1 below :

**Figure 1. PRISMA Flow Chart**

## Results and Discussion

The search results in this study found seven articles that meet the criteria and were under the research topic. The search

was conducted by identifying the author and year of publication, research title, design, respondents, valsava manuever technique used, and result. The search results can be seen in tabel 1

**Tabel 1 : Results of the literature review**

No	Author & Years	Respondent	Design	Intervention	Result
1	Eldesoky & Elesawy (2021)	Adult patients aged from 21-60 years, patients who were getting cannulated on the arm	Quasi-experimental	patient to lie down in a supine position with the tourniquet were wrapped around the forearm. The patients were instructed to cover their nose and mouth as tightly as possible with their hands while attempting maximum expiration. The respondent was asked to perform the Valsalva technique for 16–20 seconds without pausing, with a maximum of 5 seconds of expiration. The nurse inserted the PIVCs after a 5-second wait. During PIVCs insertion, the patient maintained maximal expiration from 16 or 20 seconds. - The patient was then instructed to trim the technique by breathing deeply and note how much quieter and relaxed he/she felt	There was a statistically significant reduction in pain severity and anxiety level total mean scores in the study group after application of Valsalva maneuver than the control group. Also, there was a significant association between pain level and a total mean score of anxiety.
2	Mahmoud, Mosaad & Elghareeb (2021)	adult patients undergoing PIVC, patients of both sexes, those aged 20–60 year	quasi-experimental	The researchers were informed the patients that the VM will be conducted before PIVC. The patients were instructed to inhale deeply, then hold their breath, and then apply a tourniquet. PIVC was performed while the patient was still holding their breath. The VM lasted no longer than 20 s. After PIVC, the patients were instructed to resume breathing	In the control group, 40% of the patients had severe pain, whereas, in the study group, 43.3% had mild pain. A statistically significant difference was observed between the control and study groups ( $p = 0.0023$ ). Moreover, statistically significant differences in pain level and anxiety symptoms were observed between the control and study groups ( $p < 0.05$ )
3	Alan & Khorsid, 2021	patients (N = 110) were allocated to the Valsalva maneuver group (n = 55) and control group (n = 55) by using blocked randomization to reduce bias and achieve balance according to age and gender	prospective randomized controlled	keeping mouth closed and pinching nose while trying to exhale forcefully. This maneuver immediately increases pressure in the sinuses and inner ears. The maneuver must be maintained a little longer in order to also achieve an increase in vagal tone, at least for 10 to 15 seconds	The patients in the intervention group had less severe pain during the PIVC insertion than the patients in the control group ( $p = .001$ ). After PIVC placement, systolic blood pressure was significantly reduced in both groups ( $p = .008$ ), no other variables changed significantly. No clinical complication related to the Valsalva maneuver occurred in the intervention group.

No	Author & Years	Respondent	Design	Intervention	Result
4	Hakan et al, 2018	Patients with an American Society of Anesthesiologists (ASA) physical status score of I or II, aged between 18 and 65	Randomize control trial	patients were instructed to perform VM just before PVC: patients were asked to inhale deeply and then hold their breath after application of the tourniquet. PVC was performed during this time (VM lasted no longer than 20 s). Patients were asked to resume breathing after PVC	The study found significant differences in pain score, anxiety level, and patient satisfaction between Group C and Group M (for pain, $p = 0.001$ ; for anxiety, $p = 0.003$ ; for patient satisfaction, $p = 0.004$ ). The only difference measured between groups C and V was in pain score ( $p = 0.034$ ).
5	Sundaran, Khan, Bansal & Jyotsana (2016).	60 respondents undergoing intravenous cannulation, Patients in the age group of 18 years and above. Adult patients who are prescribed with intravenous cannulation at the time of data collection. Patients getting cannulated on the dorsum of the hand, inner and outer aspect of the forearm.	Post-test only control group design	Instructed the patient to lie in supine position and the tourniquet was applied over the forearm. Instructed to blow into a rubber tubing connected to an aneroid BP apparatus and rise the needle upto 20 mmHg for a period of 20 seconds.	There was a statistically significant difference in the mean post-test pain scores in both the groups. There was a significant decrease in the level of pain after performing valsalva maneuver as evident from the student t test value ( $-2.053$ ) which was significant at 0.05 level of significance.
6	Kadyan, 2017	The sample size comprised of 60 patients (30 in experimental and 30 in control group) posted for elective surgery and having zero pain prior to the procedure	True experimental pretest post-test	In the modified Valsalva maneuver, provider raises legs right after stop straining. This version may work better than the standard Valsalva maneuver. One study found the standard method worked for 16% of people, while the modified version worked for 46% of people. It may work better because having legs up helps more blood come back to heart. In the reverse Valsalva maneuver, sit and inhale for 10 seconds with nose and mouth close.	The study showed that mean post-test pain score of adults in experimental group was lower (1.3) than those in experimental group (5.56). There was no significant association between age and body mass index with post-test pain scores whereas there was significant association present between post-test pain scores and sex
7	Gideon, Florence, Ida & Sherina (2019)	Patients who are conscious & well oriented, between the age group of 18 to 65	experimental study with post-test only	Subjects in the experimental group was asked to blow into rubber tubing connected to a sphygmomanometer dial and raise up to 20 mm Hg for a period of at least 20 seconds Twenty seconds later, a venous tourniquet was applied and peripheral venous cannulation	The study highlighted evidence of statistically significant difference in the mean pain score of the subjects undergoing peripheral intravenous cannulation using standard care and valsalva technique ( $p$

No	Author & Years	Respondent	Design	Intervention	Result
				will be attempted. If the proposed vein is still not prominent enough to be cannulated, it was gently tapped upon and the time taken will be recorded.	

Based on the results of the search for articles show us if Valsalva maneuver effective in reducing the pain in patients undergoing intravenous cannulation. Peripheral intravenous cannulation is one of the most common invasive procedures carried out in the hospital. Peripheral venous cannulation is mandatory for patients requiring intravenous drugs/fluids to be administered or for emergency. represent a potential source of considerable pain and distress.

In modern medical practice, more than 60% of patients receive intravenous therapy during their admission. Inserting intravenous cannulation is a significant source of pain and also distress for patient when hospitalization. To integrate comfort measures into daily patient care, pain management should be a prime concern for nurses (Gupta, Agarwal, Dhirraj, Tandon, Kumar, Singh et al, 2006).

The procedural pain was reported by patients, immediately after the first attempt of peripheral intravenous cannulation and was measured through the Faces Pain Scale-Revised (FPS-R), which includes a numeral rating scale from zero (no pain) to 10 (maximum pain), and a series of faces with an expression changing from no pain to severe pain. Scores between 4 and 6 were considered to be moderate pain, and scores between 7 and 10 as severe pain (Hicks, von Baeyer L, Spaford et al, 2001). Pain has been identified as the primary outcome of intravenous cannulation insertion, irrespective of the size of cannula used.

In addition, Valsalva maneuver has been known as a physiological method which

has been used to decrease pain in different procedures (Wismeijer & Vingerhoets, 2005). The Valsalva maneuver reduces both somatic and physiological aspects of painful procedures (Tully, Jung, Patel, Tukan, Kandula, Doan et al, 2020).

Valsalva maneuver was done by attempting to exhale against a closed airway. This can be done by keeping the mouth close and pinching the nose while trying to breathe out. Performing Valsalva maneuver prior to peripheral venous cannulation reduces the pain of venous cannulation. Pain reduction with Valsalva can be explained with neuroanatomical, pharmacological and electro physiological factors involving cardiopulmonary or sinoaortic baroreceptors. They are activated with increase in intra thoracic pressure during Valsalva manoeuvre. Experimental work have suggested that a close coupling exists between the system controlling cardiovascular functions and those modulating perception of pain as activation of either cardiopulmonary baroreceptor or sinoatrial baroreceptors reflex are induces antinociception (Basaranoglu, Basaranoglu, Erden, Delatioglu, Pekel et al, 2006).

The Valsalva maneuver is more benefit for patient and also nurse because it is simple to perform, physiological, time and cost effective, painless, no side effects, and patient-friendly. Therefore, the Valsalva maneuver may be considered as a good alternative in patients who do not choose pharmacological intervention. The Valsalva maneuver is effective and useful in reducing pain because it is easily

applicable and physiologically effective, time and cost effective, painless, without side effects and compatible with the patient, which can be effective in reducing pain in patients who refuse medication.

## Conclusion

Pain during intravenous cannulation mostly felt by patient, so it requires appropriate intervention. Valsava Manuever is one of the intervention that aim to reducing pain during IV cannulation. Valsava manuever can be done by keeping the mouth close and pinching the nose while trying to breathe out, at least for 10 to 15 seconds.

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