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QUALITY OF LIFE FOR PIGTAIL-ATTACHED PATIENTS : A LITERATURE REVIEW

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ABSTRACT

Pigtail catheter with Heimlich valve is renowned for its flexibility and less invasive operation which results in less discomfort has increased markedly In a stud, pigtail catheter drainage of pleural effusion was successful in 82.35%. The insertion of an intercostal drainage is a painful experience, and the pigtail catheter with Heimlich valve offers an alternative that is less painful, improve self esteem and positive feeling, and reducing Length of Stay (LOS) as well as reduced hospital cost, an adequate alternative to management the ambulation of patients with prolonged air leaked (PAL) and given the opportunity to do work also Activity Daily Living (ADL). Furthermore, it minimises the presence of nosocomial infections. WHO has noticed that many mechanistic models of medicine or medical practice only concern to eradicate the disease or symptoms while health care is essentially to maintain the patient's well-being as its primary aim. For way of examples pigtail catheter with Heimlich valve which is modification of large chest tube and can be complicated in use. The objective of this literature review is to identify the quality of life for a patient who is attached with a pigtail catheter with a Heimlich valve due to air and/or fluid in the pleural cavity. Literature review was done with online database engines, including Scopus, Science Direct, and Semantic over 2017 to 2023, using PRISMA checklist protocol to develop its eligibility criteria. Data source 6 journal articles are selected due to suitable criteria from a total of 301 articles using keywords: chest tube OR pigtail OR Heimlich valve AND pain OR quality of life. Pigtail catheter with Heimlich valve can improve the quality of life of patients. Though there are not specified bluntly, pigtail catheter with Heimlich valve has an evident to minimize the risk of nosocomial infection, improve self esteem and the social interaction of patients, painless and less traumatized, and give enough time to heal itself as the cavity began to dry.

Keywords: *Pigtail; Heimlich valve; Chest tube; Quality of Life.*

INTRODUCTION

Pneumothorax or fluido pneumothorax is a crucial condition when pleural cavity contains some air or/and fluid that may cause symstoms such as shortness of breath, chest pain, discoloration of skin or lips into blue, increased heart rate, and loss of consciousness. Accumulated excessive fluids, air, and abscesses at the body such as from intra abdominal cavity, pleural cavity, and wound are required to expel it (Aini & Syafa'ah, 2021). Drain has been designed and used to remove the accumulated to release the tension inside the cavity. Drains that are

placed in the chest called chest tubes are done by a professional worker in the critical care ward, like thoracic surgeon, an anesthesiologist, and physicians, or post-surgically in certain operations (Aukes et al., 2021). Medical diagnoses that indicate the need of chest tubes are pleural effusion, empyema, hemothorax, pneumothorax, pleurodesis, and pleural effusion (Khare et al., 2022). Hippocrates has introduced the concept of Water Seal Drainage (WSD) to treat thoracic empyema in a child (Narasimhan et al., 2017). This WSD system needs extra management to minimize disadvantages. While some procedures to be maintained are the correct level of water, treating, cleaning, and sterilizing drainage tools, the weight of WSD bottles restrics the patient's ambulation, causing an increase in the length of stay (LOS), thus increasing health care costs (Aini & Syafa'ah, 2021). Furthermore, insertion of a chest tube is a painful experience. It becomes a challenging situation for the patients and the health care provider when the tube needs to be kept in a place for a longer time (Narasimhan et al., 2017).

Pigtail catheter is characterized by its small bore and flexibility, combined with Heimlich valve which is known by its advantages like viable, economical, comfortable, safe, effective, and an efficient alternative in the management of patients requiring prolonged pleural cavity drainage (Sikander et al., 2022), low-cost, suitable, safe, efficacious, and an adequate alternative to management the ambulation of patients with prolonged air leaked (PAL), less invasive operation which result in less discomfort as the insertion of an intercostal drainage tube is a painful experience, minimizing the pain and the presence of nosocomial infection for outpatient, reduce the duration of using analgesic and the occurance of complications, clinically stable and effectively for ambulatory setting which is improve the quality of life (Aini & Syafa'ah, 2021 ; Narasimhan et al., 2017 ; Meenakshisundaram et al., 2019). In patient presenting trauma injuries, the use of pigtail in lieu of chest tube has been associated with a higher initial output volume, a reduced risk of pain, and a shorter tube duration (Beeton et al., 2023). Wicaksono & Harsono (2021) reported the use of the Heimlich valve to reduce the risk of prolonged hospitalisation and facilitate outpatient management in the case of a 53 years old man with pneumothorax and fibrosis. Comparing intercostal tube drainage with pigtail catheter, patients with pigtail catheters had less wound pain, fewer complications, and no kinking or dislodging of the tube (Khare et al., 2022 ; Kawaguchi et al., 2021). The purpose of this literature review is to identify the quality of life of outpatients who are attached with pigtail.

RESEARCH METHODS

We considered our searching by adding inclusion and exclusion criteria to avoid misleading data. We realize a pigtail catheter with a Heimlich valve as a medical practice that nurses can not take as prior therapy but collaboration. Many of the research we have found are medical practice and none of that has measured the quality of life from patients who are attached with pigtails. The Division of Mental Health and Prevention of Substance Abuse World Health Organization has noticed that many mechanistic models of medicine or medical practice only concern to eliminate the disease or symptoms while health care is originally to maintain the patient's well-being as its primary aim (Division of Mental Health and Prevention of Substance Abuse World Health Organization, 2012). WHOQOL built a pilot assessment of overall quality of life and general health perceptions that is contained in six domains (physical, psychological, level of independence, social relationship,

environment, and spirituality/religion/personal beliefs). Due to achieving the high representative literature review, The PICOS framework was used to develop the eligibility criteria and the PRISMA checklist will be used to discover the objectives of the literature review.

Tabel 1. Criteria PICOS framework

Criteria	Determinant
Population	Patient who was attached with a small bore chest tube catheter and Heimlich valve known as pigtail.
Intervention	Effectiveness to improve quality of life due to pain, mobility, and social interaction
Comparator	Patient with no pigtail-attached
Outcome	Outpatient attached with pigtail
Study type	Original research, review article, case study, open access
Time	2017 – 2023
Language	English

Criteria PICOS framework consist of Population are patient who was attached with a small bore chest tube catheter and Heimlich valve known as pigtail. Intervention is to show effectiveness to improve quality of life due to pain, mobility, and social interaction. Comparator Patient with no pigtail-attached. Outcome is Outpatient attached with pigtail. Study type is original research, review article, case study, open access. Time 2017-2023.

RESULT AND DISCUSSION

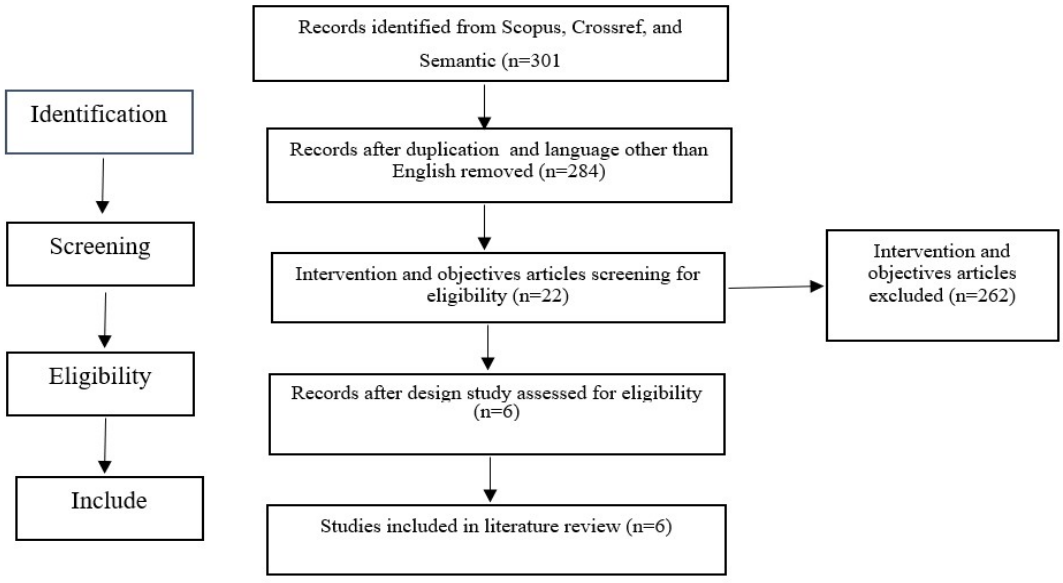

Figure 1 : Flow chart of study selection

The literature search was focused into the last 7 years of publication, covering the years 2017 to 2023 in the international context and reputable journal articles. The

data used in this study were secondary data. The Scopus, Science Direct, and Semantic databases were the online databases engine that is used for literature search in this review. There are 301 journal articles found and match with the keywords chest tube OR pigtail OR Heimlich valve AND pain OR quality of life from the articles published in three databases. The obtained search results are then checked for language which removed 5 journal articles, duplication which revealed 12 duplicate articles were removed, intervention and objectives which removed 262 articles, not an original research or case study are to remove 16 journal articles. Based on the feasibility of the inclusion and exclusion criteria, the number of journal articles that are obtained to study are 6 articles that could be used in a literature review. The researcher extracted data manually and independently then checked for its possibility of errors. The extracted data include the publication year, intervention and objectives of the study, pigtail or Heimlich valve attached and study design.

Table 2. The Results of The Reviewed Article

No	Author, Year	Design	Sample	Clinical Condition	Intervention	WHOQOL
1	Narasimhan et al., 2019 (4)	Case study	A 14-year-old boy	Complaint with pleuritic chest pain, dyspnea on exertion, found to have a loculated empyema of the right side with thickened pleura	1. Open decortication: removed the parietal pleura from the chest wall, and visceral pleura from the lung 2. On the 10th postoperative, attached a modified Heimlich valve to the ICD 3. Patient discharged	Patient confirmed that the pain has minimized although no objectives scale of pain was included, improve self esteem and positive feeling, and reducing LOS as well as hospital cost
2	Lam et al., 2017 (Lam & Kazeros, 2017)	Case study	45-year-old male from Guyana	Hypertension presented with shortness of breath and dypsnea on exertion. Unintended losing 20lbs body weight over the past	1. Chest tube placement and antibiotics on broad spectrum 2. Patient tolerated with HV and was discharged from the hospital with recommendation for close follow-up	Patient complained of less energy and fatique due to unintended weight but said that discharges with HV attached was given an

No	Author, Year	Design	Sample	Clinical Condition	Intervention	WHOQOL
				month, denied fevers, chills, night sweats and cough. Large left sided pleural effusion which drained a purulent fluid	with pulmonary and cardiothoracic surgery	opportunity to work, doing ADL, and to determined his level of independence. HV has been reducing his LOS and hopital cost.
3	Aukes et al., 2021 (2)	Case study	5-year-old boy	General illness, fever, abdominal pain accompanying a primary infection with varicella-zooster virus. Later developed progressive coughing, shortness of breath, fever.	1. Oxygen therapy and IV treatment 2. Chest tube inserted 3. Removed chest tube after a week 4. Clinical status deteriorated 5. Placed 2 chest tubes, intubated, continued antibiotics 6. Attached a HV to recover at home setting	Patient were able to live at home with his family and attend school with the HV in place, not recorded about limitation in daily life. HV has reduced LOS and hospital cost
4	Khare et al., 2022 (3)	Retro-spective cohort study	60 patients with pleural effusion	Reviewed medical record from patient hospitalization during Januari 2021 to June 2022	1. Determine the population, sample setting, study duration, sample size, exclusion and inclusion criteria 2. Chest tube and pigtail catheter insertion	Patients was reported a reduction in pain level (n=6; 20%; p=0.028), shorter the LOS (mean 9.5; p=0.028), minimises incidence of complication (n=5; 16.7%; p=0.222), duration of HV attached (mean value 4.5;

No	Author, Year	Design	Sample	Clinical Condition	Intervention	WHOQOL
						p=0.017), and no kinking or tube dislodgement.
5	Sikander et al., 2022 (5)	Retro-spective cross-sectional study	467 patients with PAL	Prolonged Air Leak (PAL) with benign or malignant parenchymal disease	Heimlich valve attached	HV on PAL grade 1 have the least frequency of lung collapse (n=8; 42%; p=0.006), residual space (n=1; 5.2%, p<0.001), and readmission (n=5; 26.3%; p=0.001). Patients with larger leaks require some form of intervention in hospital to prevent complication after discharged with HV.
6	Yoldas et al., 2019 (Yoldaş et al., 2019)	Prospec-tive study	50 patients underwent tube thoracosto-my	PAL due to surgery (n=13)	Heimlich valve systems	21 patients had anxiety discharging with a chest drain and HV, 5 from 50 patiens had a problem with the system and wound care. Total 80% of the patients have been thinking that the aim of the system is "to

No	Author, Year	Design	Sample	Clinical Condition	Intervention	WHOQOL
						make them more comfortable at home and shorten the LOS".

The PRISMA Flow diagram is shown in Figure 1. Based on a search for literature studies across three databases, a total of 301 suitable journal articles to these keywords were found. The obtained search results are then checked for language and duplication, which revealed five articles were published in a language other than English and twelve duplicate articles were removed. The remaining 284 articles then conducted a screening based on intervention and objectives of the study (n=262), and design study (n=16). Table II describes the characteristics of the study which is a quantitative study with the following descriptions: original article (n=2), case study (n=3), ERS international congress abstract (n=1). The selected studies were critically reviewed into search terms study then data extraction also checked the possibility of error data and risk of bias.

DISCUSSION

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This study has shown several advantages by using a pigtail catheter with a Heimlich valve to remove the accumulated fluid or water inside the pleural cavity. We have used six domains in WHO Quality of Life to identify which domain has improved better after the insert of the HV. WHOQOL is (1) physical; (2) psychological; (3) level of independence; (4) social relationship; (5) environmental; (6) spirituality/ religion/ personal beliefs. Children have an ability to adapt with the most unfavorable conditions (1p & 4p). According to the finding, domain number one has proved to be significant indication to improve physical condition of the patients particularly childs. Although no pain scale was included to establish the evaluation of pain, subject statements from patient or/and patient families can be taken as supporting data in this study. Regarding wound pain the chest tube-associated pain, patient with pneumothorax have more tolerance by the pigtail catheter attached (Rutherford, 2023). Regarding to express wound pain, patient with chest tube had a higher pain score at 4 h post operatively and the next morning after the surgery (Kawaguchi et al., 2021).

Patients with a Heimlich valve move more quickly and comfortably. By slipping the device under his garments, the sufferer may navigate the hospital ward. Although the patients free to move, the risk of dislodgement is less than with chest tube (Hussein et al., 2017). Furthermore, pigtail catheter has no infected or complication issue for ambulatory management (Lin et al., 2011 ; Salé et al., 2020). This enables pulmonary function to recover more quickly, boosts patient drive and independence, and removes the stigma attached to chest tubes (KY et al., 2003).

Considering the pigtail catheter with other drainage methods reveals a variety of benefits. Patients attached with pigtail has a high success rate in the outpatient setting as the lung was fully re-expanded on day 6 and

the catheter was removed with no readmission to hospital (Salé et al., 2020). Patients are able to walk more swiftly as a result to their tiny size, light weight, and ease of carrying. Safe, effective, and straightforward to use. Both people and healthcare professionals may easily comprehend its purpose and how it operates. The Heimlich valve can be used only once without needing to be re-sterilized due to its comparatively low manufacturing cost (Makanga et al., 2016).

The use of drainage devices in the outpatient management of pneumothorax patients can reduce hospital days by minimising the risk of enlarging pneumothorax, asymptomatic pulmonary oedema and device malfunction, leakage or dislodgement (Hallifax et al., 2020). Kulvantuyu, et al (2021 in Rutherford, 2023) found that small caliber pigtail catheter which is 14 fr to be as effective draining traumatic hemothorax. It revealed by attaching HV to drainage pleural cavity has reduced the length of stay and it is associated with the hospitalization care-cost (Khare et al., 2022). Compared to other drainage systems, chest tube has a significantly longer length of stay than pigtail which means higher medical costs to be paid (Rizer et al., 2022). Its associations can be shown as a linear line. The more accumulated air, fluid, and/or water, the higher intensity of pain and lead to poor prognosis. The more duration of length of stay, the higher the cost would be. Additionally, the Hemlich valve can be utilized in a number of positions without needing to be clamped. Not only at the patient's chest but also elsewhere (Makanga et al., 2016)

CONCLUSION

Pigtail catheter was known as heimlich valve and became the last option for patients who have persistent air leak but no need for hospitalization. Using a Heimlich valve provides benefits over other drainage methods; in addition to being compact, lightweight, and portable, it also enables patients to move around more quickly. Additionally, it is secure, easy to use, basic, and effective.

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