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Review Article

Disparities in Access and Use of PleurX Catheters for Treatment of Malignant Pleural Effusion: A Literature and Experience Based Review

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ABSTRACT

It is not uncommon for patients with metastatic cancer to experience recurrent buildup of fluid in their pleural space. These malignant pleural effusions (MPE) are often experienced in late-stage illness with limited (<1 year) life expectancy and often present with shortness of breath, chest pain and discomfort, contributing to the morbidity of the patient's illness. Tunneled indwelling pleural catheters (IPCs), including the PleurX by Beckton Dickinson (Franklin Lakes, NJ), are devices that are inserted on an outpatient basis that allow rapid and self-administered relief of symptomatic dyspnea, thereby offering an important palliative care option to patients with MPE. Current literature suggests these IPCs have enhanced efficacy compared with existing treatment options for MPE such as recurrent thoracentesis. However, the maintenance of these IPCs, including dressing changes and monitoring of fluid levels to avoid overuse or contamination, ideally requires the assistance from a family member or a home health aide. In this paper, we postulate whether the cost and maintenance demand of IPCs make them inaccessible to underserved communities, thereby contributing to the existing health disparities in health outcome by socioeconomic class. While there exists, no current literature looking at this issue specifically, existing literature does support a significantly lower utilization of health home aids in black, hispanic, and low-income populations. Our own experience at a level 1 trauma center in Newark, NJ, serving an at risk, underserved community, further suggests that the required visiting nurse and bottle replacement time and resource costs are prohibitive for this population. Given our experience and the limited literature, we believe additional research is warranted to establish plausibility of IPC use in lower socioeconomic strata.

Introduction

Malignant pleural effusion (MPE) is a frequent complication in patients with metastatic cancer, estimated to affect over 150,000 patients in the United States every year [1]. As a supranormal quantity of fluid accumulates in the pleural space, patients can experience quality of life limiting dyspnea, chest pain, and discomfort [1]. The life expectancy for patients with MPE is estimated between 1 and 12 months making palliative care a priority [2]. There are several modalities for symptomatic treatment of MPE including needle drainage with repeat thoracentesis, chest tube thoracostomy, thoracoscopy with pleurodesis, and indwelling pleural catheter for repeated drainage [2]. Several studies comparing these various approaches have found that they have similar effects on relieving patient-reported dyspnea [3, 4]. The decision for which treatment approach to use should be made jointly between the provider and patient, taking into consideration patient preference, cost, ability to tolerate complications, family support, and patient autonomy [5].

Tunneled indwelling pleural catheters (IPC) are currently used as a first-line treatment for recurrent MPE, with PleurX by Beckton Dickinson being the most popular. Placement is a minimally invasive procedure, and is associated with shorter hospitalizations for MPE as compared to other treatments, and can even be done in an outpatient setting [5]. The PleurX tunneled catheter allows patients to drain pleural fluid in their own homes and can lead to pleurodesis in many patients as well [4]. There have been studies assessing the optimal drainage frequency for achieving pleurodesis and have found that daily drainage of pleural fluid

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is more effective than symptomatic drainage [4]. However, analysis of the cost-effectiveness of daily drainage versus symptomatic drainage found symptomatic drainage to be the superior strategy [6]. Further, PleurX catheters offer an alternative for patients with trapped lung who are not good candidates for chemical pleurodesis [2].

Regardless of the drainage frequency, effective use of the PleurX tunneled catheter requires knowledge and ability of the patient or an assistant to drain the correct amount of fluid in a manner that minimizes the risk of contamination. Utilizing a PleurX catheter requires regular, hygienic dressing changes, careful use of the suction bottle, monitoring output, and proper disposal of materials. This can be challenging for terminally ill patients to do on their own, and it is therefore recommended that patients have assistance with drainage from a family member or a home health aide.

From experience in an urban, underserved community with patients who have MPE, it was postulated that the cost and upkeep required to safely use a PleurX catheter is prohibitive for many low income or disadvantaged patients, representing and perpetuating ethnic and socioeconomic disparities in healthcare. Currently, there is a scarcity of literature pertaining to disparities in access to PleurX catheters. This paper examines the literature pertaining to barriers that may inhibit patients from effectively using or having access to a PleurX catheter, as well as shares the insights from working with patients with MPE in an under-resourced, urban setting.

Existing Literature

At present there is scarce literature that examines the utilization of indwelling pleural catheters across socioeconomic strata. As such, we report on literature regarding the cost-effectiveness of MPE treatments, and disparities in access to home-health services.

With the multitude of approaches for treatment of MPE, there has been a recent surge in research investigating the cost-effectiveness of the various modalities. One cost-effectiveness analysis found that using a tunneled indwelling pleural catheter such as PleurX is the most cost-effective strategy for patients with a life expectancy of 3 months, but the cost effectiveness declines with prolonged survival due to the continued requirement for home-health nurse attention and purchase of drainage bottles [7]. Another analysis comparing talc pleurodesis with indwelling pleural catheter found that the indwelling pleural catheter is the more cost-effective option when self-drainage is possible, but becomes less cost-effective when 2 hours of nursing care per week are required [8]. There currently is a lack of literature regarding the direct cost burden on patients with MPE, however, it is likely that indwelling pleural catheters are more expensive in this regard because of the recurring expense of drainage kits.

A 2022 study by Fashaw-Walters and colleagues assessed the disparities in usage of high-quality home-health agencies amongst medicare-enrolled home-health patients. They showed that black and hispanic patients were less likely than their white counterparts to use a high-quality home-health agency by 5.6 and 10.9 percent respectively. They also found that low-income patients were 2.0 percent less likely to utilize a high-quality home-health agency as compared their counterparts. 40-77 percent of the disparity across ethnic and socioeconomic lines could be explained by neighbourhood factors [9]. It is also well documented that patients without insurance or who have medicaid are more likely to have functional impairments [10]. For MPE patients without the ability to manage their catheter on their own or with family assistance, a home-health nurse capable of draining a PleurX catheter is critical for the treatment to be effective. Unfortunately, access to this kind of service appears to be limited for minority patients, those without private insurance, and those residing in certain geographical locations. As a consequence, these patients are limited in their choice of treatments for MPE, and have to choose other options such as repeat thoracentesis, chemical pleurodesis, or surgical pleurodesis, which may be associated with longer hospital stays, more visits to a medical center, decreased quality of life, and increased complication rates [2].

Patients using the PleurX catheter need to order drainage bottles on their own or have them provided by the home-health agency. Purchase of the drainage bottles may not be covered by the patient's insurance, and the cost would be completely incurred by a patient without insurance. Currently, under the patient-driven groupings model of medicare reimbursement for home-health services, PleurX vacuum bottles are classified as bundled non-routine supplies, and the home-health agency is responsible for their cost. The agency is compensated for their service based on patient characteristics, but not on the actual cost of the product, leading them to take a loss for patients with a PleurX catheter [11]. This cost either gets absorbed by the home-health agency or is passed on to patients, directly or indirectly. Lower socioeconomic status patients are disadvantaged either way because they are already less likely to receive care from a high-quality home-health agency [9].

Our Experience

University hospital is a level 1 trauma center located in Newark, New Jersey serving a large catchment area in NY metropolitan area. The patient population is an underserved and at-risk cohort that have numerous co-morbid conditions and risk factors for prolonged hospitalization. There is also a significant barrier to healthcare access and most patients who present with lung cancer are at an advanced stage. Many of the patients are seen in the ED and as referrals from primary care physicians sent directly to pulmonologists for initial evaluation. The nature of initial provider-patient encounters has a direct impact on the level of compliance that patients tend to exhibit for further surgical procedures. For example, if patient is requiring multiple attempts at biopsy without yield, the patient is less likely to comply with definitive treatment plans that may include pleurodesis, or placement of tunneled pleural catheter. Additionally, as previously stated, our patient population do not have the necessary insurance benefits to cover the required costs of care for tunneled pleural catheter as evidenced by the need for visiting nurse and bottle replacements.

Discussion

Recurrent MPE is a significant, quality of life altering condition in patients with cancer. Management of MPE can be done with various modalities, but tunneled indwelling pleural catheters such as PleurX are a preferred first-line treatment due to benefits such as decreased requirement for hospital visits, rapid relief of symptoms, and cost-

effectiveness in some patients. Unfortunately, there are barriers which limit access to indwelling catheters, particularly for patients of lower socioeconomic status. The limiting factors are the recurring cost of purchasing drainage kits and access to high-quality home-health nursing. A consequence of these barriers is that patients and providers are forced into using a different treatment choice that may be unfavourable to the patient.

Limitations of this paper are that it is based on the experience from a single center and that the proposed barriers to access for PleurX catheters are extrapolated from documented barriers to home-health services and cost-effectiveness analyses. Currently, there is no existing data examining the use of PleurX catheters for MPE across socioeconomic strata. Although this paper provides insight into the possible disparities in access to PleurX, research is required for quantification of the disparity and validation of the factors contributing to it.

PleurX catheters should not be a tool reserved for those of higher socioeconomic status. Their function as a quality of life preserving, palliative tool, makes them of vital importance for patients in their terminal months of life. Research and reform of the health system are required to identify and correct the causes of disparate access to PleurX catheters.

Conclusion

The development of the PleurX tunneled catheter technology offers an effective and convenient alternative for symptomatic recurrent MPE. The minimally invasive procedure, associated shorter recovery, and the ability to rapidly relieve dyspnea and discomfort without a hospital visit make PleurX a particularly appealing candidate for palliative care for patients with limited life expectancy associated with MPE. Our experience at University Hospital suggests that the cost and maintenance required of the PleurX limit its application in resource poor communities. We believe additional research is warranted to examine the utilization of the PleurX across socioeconomic strata and ways to address this suspected disparity.

References

1. George V, Rahman NM (2020) More Than Dollars and Cents: Putting a Price on Indwelling Pleural Catheter Drainage. *Ann Am Thorac Soc* 17: 685-687. [Crossref]
2. Penz E, Watt KN, Hergott CA, Rahman NM, Psallidas I (2017) Management of malignant pleural effusion: challenges and solutions. *Cancer Manag Res* 9: 229-241. [Crossref]
3. Davies HE, Mishra EK, Kahan BC, Wrightson JM, Stanton AE (2012) Effect of an indwelling pleural catheter vs chest tube and talc pleurodesis for relieving dyspnea in patients with malignant pleural effusion: the TIME2 randomized controlled trial. *JAMA* 307: 2383-2389. [Crossref]
4. Wahidi MM, Reddy C, Yarmus L, Feller Kopman D, Musani A et al. (2017) Randomized Trial of Pleural Fluid Drainage Frequency in Patients with Malignant Pleural Effusions. The ASAP Trial. *Am J Respir Crit Care Med* 195: 1050-1057. [Crossref]
5. Argento AC, Schembri F (2017) The Evolving Role of the Indwelling Tunneled Pleural Catheter. A Means to an End. *Am J Respir Crit Care Med* 195: 976-978. [Crossref]
6. Shafiq M, Simkovic S, Hossen S, FellerKopman DJ (2020) Indwelling Pleural Catheter Drainage Strategy for Malignant Effusion: A Cost-Effectiveness Analysis. *Ann Am Thorac Soc* 17: 746-753. [Crossref]
7. Puri V, Pyrdeck TL, Crabtree TD, Kreisel D, Krupnick AS et al. (2012) Treatment of malignant pleural effusion: a cost-effectiveness analysis. *Ann Thorac Surg* 94: 374-379. [Crossref]
8. Olfert JAP, Penz ED, Manns BJ, Mishra EK, Davies HE et al. (2017) Cost-effectiveness of indwelling pleural catheter compared with talc in malignant pleural effusion. *Respirology* 22: 764-770. [Crossref]
9. Fashaw-Walters SA, Rahman M, Gee G, Mor V, White M et al. (2022) Out Of Reach: Inequities In The Use Of High-Quality Home Health Agencies. *Health Aff (Millwood)* 41: 247-255. [Crossref]
10. Snyder RA, Chang GJ (2020) Insurance Status as a Surrogate for Social Determinants of Health in Cancer Clinical Trials. *JAMA* 3: e203890. [Crossref]
11. Vrtis MC, DeCesare E, Day RS (2021) Indwelling Pleural Catheters for Malignant Pleural Effusion: A Time for Action. *Home Healthc Now* 39: 302-309. [Crossref]