

Airway clearance techniques for pneumonia patients: A survey of Thai physical therapists

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ABSTRACT

Background: Pneumonia remains a significant global health challenge, necessitating effective management strategies, including airway clearance techniques (ACTs) utilized by physical therapists (PTs).

Objective: This study aims to investigate the selection and usage of ACTs among Thai PTs and examine the influence of work characteristics on these choices.

Materials and methods: A descriptive survey design was employed, targeting licensed PTs in Thailand with at least one year of experience in chest physical therapy. The survey, distributed via online forms and physical therapy units, gathered data on personal demographics, commonly used ACTs, and work characteristics. Out of 178 responses, 137 were included in the study.

Results: The results indicated a predominant reliance on manual techniques, particularly percussion and postural drainage, regardless of experience level. However, PTs specializing exclusively in chest physical therapy showed a higher propensity for using advanced techniques and devices such as positive expiratory pressure (PEP) and oscillating positive expiratory pressure (OPEP) devices. The study highlights significant gaps in training and access to advanced airway clearance devices, suggesting a need for targeted continuing education programs.

Conclusion: The findings underscore the importance of promoting a broader range of ACTs in clinical practice to improve patient outcomes. By addressing the barriers to adopting advanced techniques, PTs can enhance their therapeutic interventions and provide more comprehensive care for pneumonia patients. This study provides valuable insights into the current landscape of airway clearance therapy in Thailand, emphasizing the need for improved training and access to necessary equipment to optimize patient care.

Introduction

Pneumonia remains a significant global health challenge, particularly among vulnerable populations such as the elderly and immunocompromised individuals.¹ Effective management of pneumonia encompasses various therapeutic approaches, with physical therapy playing a vital role in improving patient outcomes.² A key aspect of this management is addressing decreased lung volume due to atelectasis, which is crucial for improving ventilation and ventilation/perfusion matching.³ Among the array of interventions, airway clearance techniques (ACTs) stand out as essential tools, particularly in the late

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stages of pneumonia or for patients using mechanical ventilation.⁴ These techniques are pivotal for respiratory physical therapists (PTs), aiding in the removal of mucus from the airways and enhancing lung function.

Understanding the pathophysiology and prognosis of diseases like pneumonia is essential for PTs who treat these patients. However, in the context of Thailand, PTs have diverse work characteristics in hospitals, and there is no standardized course for a Diploma of the Thai Board of Physical Therapy in each specialty.⁵ As a result, the choice of ACTs is often based on undergraduate education and may be further supplemented by personal experiences in treating this patient group. This may lead to a variety of treatment approaches for the same condition.

The lack of information on the selection of ACTs makes it challenging to analyze the problem or create appropriate curricula in Thailand. This study aims to investigate the ACTs selected by Thai physical therapists and do different work characteristics influence their selection of ACTs.

Materials and methods

This study employs a descriptive survey design to examine the ACTs used by PTs for pneumonia patients across Thailand. Ethical approval was obtained from the Research Ethics Committee of Christian University of Thailand, under the reference number 07/2566. The target participants were licensed physical therapy in Thailand with at least one year of experience in chest physical therapy, aged between 22 and 60 years.

The survey was distributed using Google Forms through PT groups on social media platforms. It was also sent to physical therapy units in hospitals across Thailand.

Data collection spanned two three-month periods, with reminder invitations sent after two weeks to encourage participation.

The survey questionnaire consisted of 15 items divided into three sections. The first section gathered personal information, including age, gender, education level, region of healthcare facility, and type of healthcare facility. The second section collected data on the most frequently used airway clearance techniques. To ensure validity and relevance, the questionnaire was reviewed and evaluated by two qualified PTs with over five years of experience in chest physical therapy.

Data analysis

Data analysis for this study involved chi-square tests to compare categorical variables, expressed as number and percentage. Statistical analysis was performed using the IBM SPSS statistical package (version 28.0), with a significance level set at $p < 0.05$.

Results

The questionnaires were distributed to physical therapy units and administered online, yielding a total of 178 responses. However, 41 questionnaires were excluded due to respondents having not worked in chest physical therapy for over a year. Consequently, 137 participants were included in this survey study.

The general characteristic of Thai PTs is shown in Table 1. An overview of the use of airway clearance techniques by Thai PTs for pneumonia patients is presented in Figure 1, while details on routine practice subgroups are shown in Figure 2 and Table 2.

Table 1. General characteristics of Thai physical therapists with varying levels of experience.

Characteristics	All group (N=137)	Exclusive chest PT (N=26)	All fields alongside chest PT (N=74)	All fields without chest PT (N=37)
<i>Age (years)</i>				
22-30 (%)	57 (42)	6 (23)	36 (49)	15 (41)
31-40 (%)	69 (50)	16 (62)	34 (46)	19 (51)
>40 (%)	11 (8)	4 (15)	4 (5)	3 (8)
Female (%)	86 (63)	11 (42)	49 (66)	26 (70)
<i>Level of educations</i>				
Bachelor's degrees (%)	105 (77)	15 (58)	64 (86)	26 (70)
Master's degrees (%)	26 (19)	8 (30)	9 (13)	9 (25)
Doctoral degrees (%)	6 (4)	3 (12)	1 (1)	2 (5)
<i>Workplace locations</i>				
Bangkok metropolitan region (%)	31 (22)	7 (28)	16 (22)	8 (22)
Southern region (%)	18 (13)	4 (15)	10 (14)	4 (11)
Central region (%)	27 (20)	4 (15)	11 (15)	12 (32)
Northern region (%)	19 (14)	5 (19)	8 (11)	6 (16)
Western region (%)	5 (4)	0	3 (4)	2 (5)
Eastern region (%)	8 (6)	2 (8)	2 (3)	4 (11)
Northeastern region (%)	29 (21)	4 (15)	24 (31)	1 (3)
<i>Types of healthcare facilities</i>				
Primary care hospitals (%)	18 (13)	0	8 (11)	10 (27)
Secondary care hospitals (%)	38 (28)	3 (11)	25 (34)	10 (27)
Tertiary care hospitals (%)	27 (20)	7 (27)	14 (19)	6 (16)
Advanced tertiary care hospitals (%)	15 (11)	9 (35)	4 (5)	2 (5)
Private hospitals (%)	36 (26)	7 (27)	21 (28)	8 (22)
Municipality (%)	3 (2)	0	2 (3)	1 (3)

Note: Data are presented as the number (%).

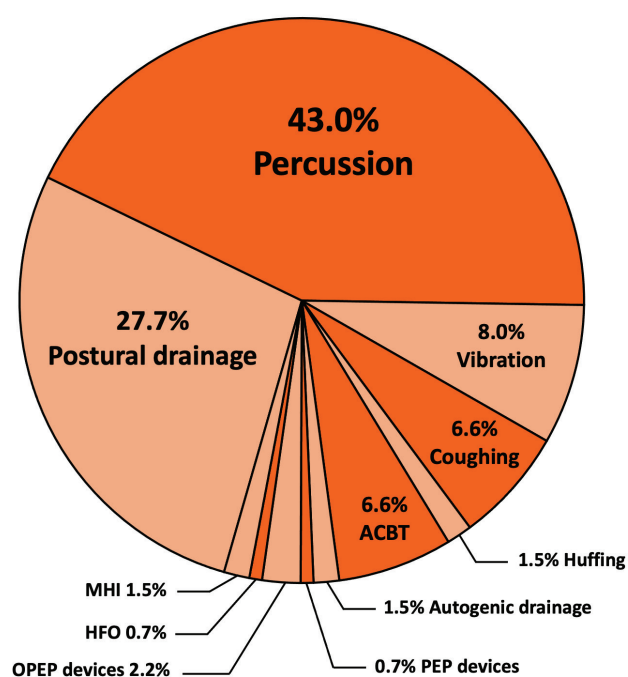


Figure 1. Overview of popular airway clearance techniques for pneumonia patients among Thai physical therapists. ACBT: active cycle of breathing technique, HFO: high frequency oscillation, MHI: manual hyperinflation, OPEP: oscillating positive expiratory pressure devices, PEP devices: positive expiratory pressure devices.

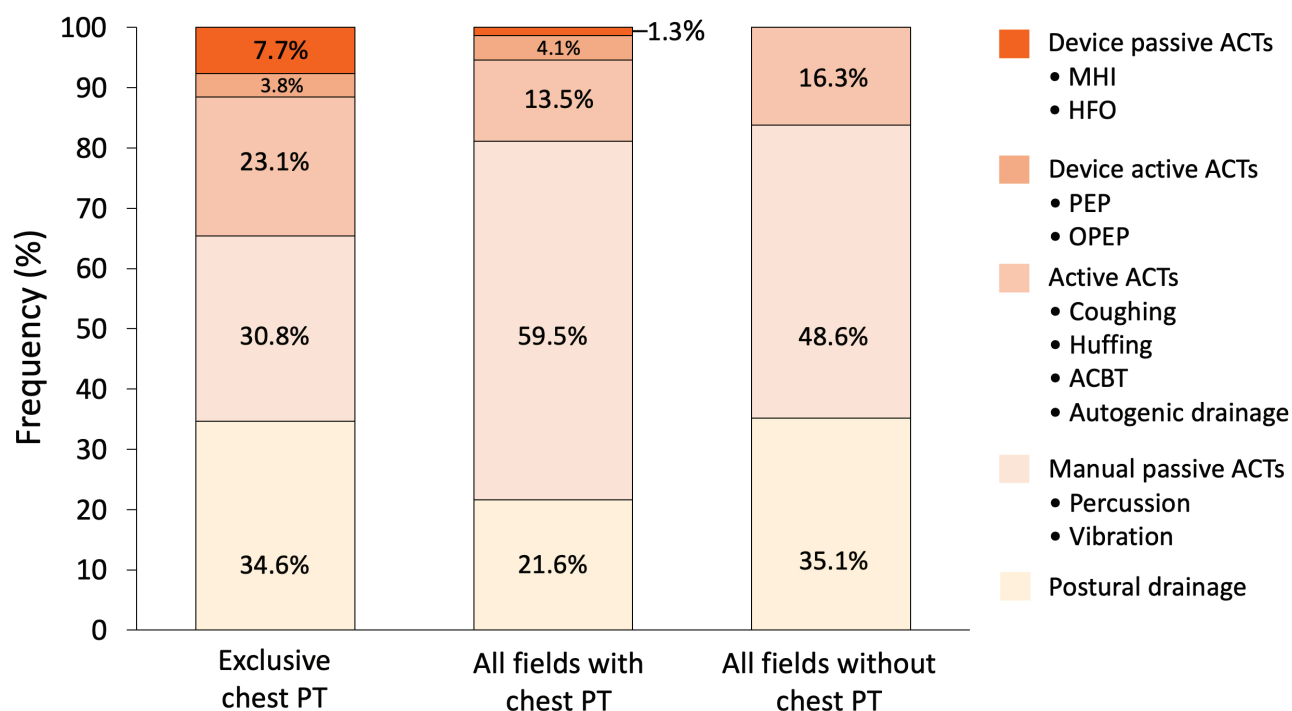


Figure 2. Popular airway clearance techniques for pneumonia patients among Thai physical therapists, presented by subgroup. ACTs are categorized based on their techniques or mechanisms for airway clearance techniques, ACBT: active cycle of breathing technique, HFO: high frequency oscillation, MHI: manual hyperinflation, OPEP: oscillating positive expiratory pressure devices, PEP devices: positive expiratory pressure devices.

Table 2. Comparison of Airway Clearance Technique Usage Among Thai Physical Therapists with Varying Levels of Experience (N=137).

Airway clearance techniques	Exclusive chest PT (N=26)	All fields with chest PT (N=74)	All fields without chest PT (N=37)
Postural drainage (%)	9 (34)	16 (22)	13 (35)
Manual passive ACTs			
- Percussion (%)	6 (22)	37 (51)*	16 (43)
- Vibration (%)	2 (8)	7 (9)	2 (5)
Active ACTs			
- Huffing (%)	1 (4)	1 (1)	0
- Coughing training (%)	2 (8)	5 (7)	2 (5)
- Autogenic drainage (%)	0	1 (1)	1 (3)
- ACBT (%)	3 (12)	3 (4)	3 (9)
Device active ACTs			
- PEP devices (%)	0	1 (1)	0
- OPEP devices (%)	1 (4)	2 (3)	0
Device passive ACTs			
- HFO (%)	1 (4)	0	0
- Manual hyperinflation (%)	1 (4)	1 (1)	0

Note: Data are presented as number (%). ACBT: active cycle of breathing technique, HFO: high frequency oscillation, MHI: manual hyperinflation, OPEP: oscillating positive expiratory pressure devices, PEP devices: positive expiratory pressure devices. * $p < 0.05$ (Exclusive chest PT vs All fields with chest PT).

Discussion

This study represents the first survey conducted among Thai PTs concerning ACTs for pneumonia patients. The predominant techniques identified in this survey were percussion and postural drainage. Interestingly, regardless of experience, PTs typically rely on these manual techniques. However, PTs who specialize exclusively in chest physical therapy showed a greater propensity for utilizing active and passive device-aided ACTs.

Pneumonia leads to decreased lung volume, increased airway resistance, and reduced compliance, ultimately causing hypoxemia.¹ Late-stage inflammatory processes can result in sputum secretion, further increasing airway resistance.⁶ Effective ACTs are crucial, yet no universally effective long-term methods exist. Techniques such as the active cycle of breathing (ACBT) and positive expiratory pressure (PEP) devices have demonstrated benefits, including improved cure rates and reduced hospital stays in pneumonia patient.²

Despite the variety of available ACTs, our survey showed no significant preference among Thai PTs across different experience routine practice. However, percussion and postural drainage were the most used techniques. Percussion is a non-invasive, cost-effective method widely practiced in Thailand and other regions such as Turkey.⁷ Its limitations include dependency on external factors such as frequency and force of application, with studies indicating challenges in maintaining effective percussion due to muscle fatigue.⁸ Moreover, manual passive ACTs show varying efficiency in airway clearance depending on the individual user and the mechanism of action of each technique.^{9,10} Postural drainage involves body positioning to use gravity for mucus movement towards larger airways, improving lung volume.¹¹ Though effective, it requires specific positions, which can be challenging to maintain and implement.

On the other hand, airflow-dependent clearance techniques, such as active techniques, using devices, and MHI, are not popular among Thai PTs. These techniques directly alter airflow in the airways, providing immediate relief by facilitating the removal of mucus and improving ventilation, which may be appropriate for low lung volume in pneumonia patients.¹² However, based on the available evidence, it is difficult to definitively determine the efficacy of each technique in pneumonia patients^{2,13} and cystic fibrosis patients.¹⁴ Therefore, prior research suggests similar effectiveness between active and manual techniques. When choosing a method, PTs might consider their effort, favoring techniques that provide comparable results with a lower workload.

In Thailand, the absence of specific guidelines for PT management in pneumonia leads PTs to rely on personal experience and undergraduate training. Comparatively, a retrospective study in Australia highlighted both similarities and differences in practice. For instance, while postural drainage is similarly popular, MHI is more commonly used in Australia.¹⁵ An expert consensus from eight countries also suggests the benefits of combining

manual techniques with MHI when sputum volume or viscosity is high.¹³ Recent clinical guidelines recommend MHI for mechanically ventilated patients due to its advantages in lung volume improvement and secretion clearance.¹⁶ Active treatments such as deep breathing exercises and early mobilization are well-supported by evidence, whereas manual techniques rely more on expert opinion.^{17,18,19}

The limited use of techniques such as vibration, huffing, and autogenic drainage, as well as devices like PEP and OPEP, highlights potential areas for improvement in training and practice. Factors such as lack of familiarity, limited access to equipment, and institutional protocols may contribute to the underutilization of these methods. This gap suggests a need for targeted continuing education programs to broaden the skill set of PTs and enhance patient care. However, while exclusive chest PTs demonstrated a greater inclination to use devices and MHI, these techniques have not been widely adopted overall.

Implications for practice and training

Given the reliance on manual techniques and postural drainage, it is crucial to promote the adoption of a wider range of ACTs. Training programs should emphasize the benefits and proper use of advanced techniques and devices to ensure that therapists are well-equipped to deliver comprehensive care. Additionally, enhancing access to essential equipment and fostering interdisciplinary collaboration can facilitate the integration of these techniques into routine practice.

Our findings highlight potential barriers to the adoption of newer ACTs, such as limited training access, equipment availability, and institutional protocols. Addressing these barriers is essential to ensure equitable access to evidence-based respiratory care. It is important to provide PTs with the necessary resources and support to effectively implement these techniques.

Limitation

This study has several limitations, including a small sample size, the absence of patient condition such as consciousness and intubation status in the survey, which may influence decision-making, reliance on self-reported data, and the measurement of technique preference rather than actual clinical practice. These factors may affect the generalizability of the findings and suggest the need for cautious interpretation.

Further research is necessary to explore the efficacy of various airway clearance techniques in different settings and patient populations. Long-term studies could provide more robust evidence to support the development of clinical guidelines and enhance therapeutic decision-making. Additionally, investigating the impact of specific training programs on technique utilization and patient outcomes would provide valuable insights into the best practices for respiratory care.

Conclusion

This study highlights the current landscape of airway clearance therapy for pneumonia patients in Thailand, revealing a predominant reliance on manual techniques and postural drainage. By understanding the preferences, challenges, and opportunities in clinical practice, we can work towards optimizing therapeutic interventions and improving patient outcomes in respiratory care. Addressing the identified barriers and promoting continuing education will be crucial in advancing the quality of care provided by Thai PTs.

Ethic approval

This study received ethical approval from the Research Ethics Committee of Christian University of Thailand (reference number 07/2566).

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Conflict of interest

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