

Assessing Attitude, Practice Levels And Associated Factors Towards Pre-Hospital Airway Management: A Survey Of Pre-Hospital Care Providers

Khairul Effendy Abdul Halim¹, Tuan Hairulnizam Tuan Kamauzaman², Mohd Shaharudin Shah Che Hamzah², Naemah Abdul Rahim³

¹ School of Medical Sciences, Health Campus of Universiti Sains Malaysia (USM), Malaysia.

² Emergency Medicine Department, School of Medical Sciences, Health Campus of Universiti Sains Malaysia (USM), Malaysia.

³ Psychiatric and Mental Health Department, Hospital Taiping, Perak, Malaysia.
Corresponding Author:

Tuan Hairulnizam Bin Tuan Kamauzaman, E-mail: hairulnizam@usm.my

Background: The implementation of Pre-Hospital Airway Management (PHAM) is crucial in providing patient care in non-hospital environments. Pre-Hospital Care (PHC) providers must have a high level of proficiency in PHAM skills to ensure safe patient treatment. This study aims to assess the levels and identify factors influencing the attitudes and practice levels among PHC providers in Perak, Malaysia, regarding PHAM.

Method: A cross-sectional study surveyed 118 PHC providers from fourteen PHC Units in Perak, including Assistant Medical Officers (AMOs) registered with the Malaysian Medical Assistant Board, using a simple sampling technique. Data collection involved a self-structured questionnaire, and analysis was performed using IBM® SPSS® version 26.0.

Results: Of the diverse positions held by AMOs, 89.8% (106) exhibited a positive attitude towards PHAM in the attitude domain, whereas 31.4% (37) reported high practice in the practice domain. Additionally, those who had attended the PHAM course exhibited a significantly positive attitude (95% CI = 1.75, 44.84; $p = 0.008$), while respondents who perceived they had received adequate training showed high practice levels (95% CI = 1.21, 7.06; $p = 0.018$).

Conclusion: Our findings suggest that there is a favourable disposition in the attitude domain than practice domain among PHC providers. Additionally, characteristics such as participation in the PHAM course significantly impact fostering a positive attitude. Furthermore, individuals who considered their training sufficient demonstrated high practice levels. Suggestions include augmenting engagement in PHAM courses and consistent participation in PHAM simulation training to cultivate favourable attitudes and bolster self-practice among PHC providers.

KEYWORDS: Attitude, Practice, Pre-Hospital Airway Management, Pre-Hospital Care Providers, Pre-Hospital Care

Introduction

Pre-Hospital Airway Management (PHAM) plays a critical role in the global Pre-Hospital Care (PHC) system and is fundamental to emergency responders (1). Effective airway management is not only vital in intensive care units and operating theatres but also in PHC settings (2). Endotracheal Intubation (ETI) is currently the gold standard for PHAM (3). According to previous studies, a lack of attitude has been addressed, while simulation with a mannequin can help PHC providers improve basic intubation skills (1-6). However, it is essential to recognize that simulations are not a complete substitute for real patient training (4-5). Training protocols for United Kingdom PHC providers are currently based on limited evidence (6-8), with most studies showing that initial successful placement of 50-60 tracheal tubes is required (8-10).

It is imperative that PHAM is performed only by appropriately skilled PHC providers (11-16). The PHC service's primary focus should be to ensure that competent providers are present in the right place, at the right time, and possess the most relevant skills (17-18). Recent reviews by the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) have highlighted the importance of appropriate PHAM (18-21). The reviews identified areas for improvement (6-10), including the need for better skills and tools for handling patients with obstructed airways, as well as the appropriate implementation of changes in airway devices and training practices to ensure patient safety.

Numerous studies have highlighted a lack of practice in using respiratory and airway devices among PHC providers, indicating the need for training to enhance skills and practice to ensure patient safety and survival (22-23). The objective of this study is to assess the levels and identify factors influencing the attitude and practice of PHC providers in Perak, Malaysia, pertaining to PHAM. We anticipate that this will aid in the formulation of policies aimed at enhancing PHAM in Malaysia.

Methods

Study Setting and Subjects

This cross-sectional study was conducted among fourteen Pre-Hospital Care Units (PHCUs) in Perak, Malaysia, from February 2021 to May 2021. The current research was registered with the Human Research Ethics Committee, USM (JEPeM): USM/JEPeM/20050253 and Medical Research & Ethics Committee, MOH, National Medical Research Register (NMRR): NMRR-19-3593-49630 (IIR). Written informed consent was obtained from the hospital directors and Chief of AMO Emergency Departments (EDs) of each hospital, and respondents were personally contacted to explain the study and obtain their digital consent. The exclusion criteria included educators of AMOs and trainers of AMOs. A total of 118 questionnaires were distributed to PHC providers who provided their digital consent, with all respondents completing their questionnaires. The sample size was estimated using the Single Proportion Formula on a reference study, with a confidence interval of 95% and power of 80% (29).

Description

The study utilized a new questionnaire adapted from the author's original one (2), focusing on socio-demography. While, attitude and practice, using a 5-point Likert Scale to gauge respondents' values (26). The questionnaire underwent a pilot study involving 31 ED AMOs,

Ipoh Hospital before e-form distribution to all 14 participating hospitals. Additionally, a validation study with minimum 30 respondents was carried out to enhance content clarity and validity (24). Each respondent was given 30 min to complete the questionnaire before they were collected, and the study questionnaires were available for respondents to refer to and answer questions.

Measures

The study explored the socio-demographic characteristics of AMOs, including Age, Gender, Ethnic, Education, AMO Position, Work Experience, Attended PHAM Course, Adequate training on PHAM. In terms of analysis, the study focused on deriving attitude scores and practice scores, with specific categorizations for positive/negative and high/low, using a 5-point scale (26). The Attitude score, consisting of 11 items, is categorized as positive or negative, with answers 4 and 5 considered positive and 1, 2, and 3 as negative on the Likert scale (25). The Practice score, consisting of 9 items, is categorized as high or low, with answers 4 and 5 considered high and 1, 2, and 3 as low on the Likert scale (25). Furthermore, the study utilized Modified Bloom's cut-off points to categorize attitudes and confidence (26). Specifically, it aimed to categorize attitudes into good and poor using a cut-off point of 75% and more categorized as good. While it aimed to categorize confidence into high and low with scores of 75% and more categorized as high (27).

Statistical Analysis

For statistical analysis, we used IBM SPSS version 26.0 to analyse the data, presenting categorical data as frequency and percentage and numerical data as mean and standard deviation. Simple Logistic Regression (SLR) tests were applied for univariate analysis, and significant variables with a p-value less than 0.25 were selected for multivariate analysis. The final model was determined using forward, backward, and stepwise selection methods. Multiple Logistic Regression (MLR) tests were used for multivariate analysis, ensuring that all test assumptions were met.

Results

In a meticulous cross-sectional investigation spanning 14 PHCUs in Perak, Malaysia, a cohort of 118 Assistant Medical Officers (AMOs), aged 23 to 53, participated, yielding insights into the dynamics of the PHC domain. Table 1 summarises the demographics of the participants. Notably, male predominance was observed, with the average age of respondents standing at a youthful 32 years. Most of the participants were also male (85.6%). Ethnic distribution showcased the dominance of the Malay populace (91.5%), albeit the commendable representation from Chinese, Indian, and other ethnic groups. The educational spectrum was characterized by the attainment of Certificate/Diploma (96.6%, $n = 114$) as the pinnacle, closely followed by bachelor's (2.5%) and master's degrees (0.8%).

While AMO Position and PHC Work Experience, AMO U29 (59.3%, $n = 70$) emerged as the most prevalent demographic, followed by cohort's internship AMO U29 (21.2%), AMO U32 (17.8%) and AMO U36 /AMO U41/42 (0.8%), underlining the youthful vigor within the PHC workforce. Strikingly, a substantial proportion of respondents reported a tenure of less than 5 years in Work Experience (49.2%, $n = 58$), signifying a burgeoning pool of nascent

talent. Regarding the PHAM Course, the study identified a substantial uptake of the PHAM course among PHC providers (66.1% n=78) than (33.9% n=40), indicating a proactive stance towards skill enhancement and positive mindset cultivation. However, a noteworthy dichotomy surfaced, with (53%, n = 63) of respondents expressing confidence in the adequacy of their training, juxtaposed against (47%, n = 55) harbouring reservations, highlighting the exigency for continual educational enrichment.

Table 2 summarises the outcome this study, both of Attitude and Practice levels. The survey illuminated an overwhelmingly positive disposition towards PHAM, with a staggering (89.8%, n = 106) of respondents exhibiting affirmative attitudes. However, practice levels oscillated, with (31.4%, n = 37) exuding unwavering assurance, while (68.6%, n = 81) grappled with subdued practice levels, warranting attention to bolster self- practice. Table 3 summarises the factors associated with attitude using SLR this study. There was a significant association of Malay Ethnic (Crude OR 4.71, 95% CI (1.04, 21.45), attended PHAM course (Crude OR 12.67, 95% CI (2.62, 61.25) and adequate training (Crude OR 6.78, 95% CI (4.42, 32.46) with good attitude. The results for the simple logistic regression were summarized in Table 3 above. Table 4 summarises the factors associated with practice using SLR this study. There was a significant association of AMO received adequate training and good practice (Crude OR 3.38, 95% CI (1.45, 7.88). The results of the SLR were summarized in Table 4 above.

Discussion

Robust descriptive statistics provided a panoramic view of key parameters encompassing Age, Gender, Ethnic, Education, AMO Position, Work Experience, Attended PHAM Course, Adequate training on PHAM., enriching our comprehension of the PHC landscape. The demographics and bipartite assessment of attitude, and practice delineated into "good" or "poor" and "high" or "low" categories elucidated the nuanced intricacies underlying performance metrics, paving the way for targeted interventions and strategic refinements. The demographic and AMOs professional landscape of PHC providers in Perak, was explored, revealing significant insights. The participant cohort exhibited a male predominance, with an average age of 32 years, suggesting a gender disparity and youthful vigour within this PHC field. The sample predominantly consisted of male participants, underscoring a gender imbalance in the PHC field. This finding aligns with the general trend observed in PHC workforce demographics (25). Furthermore, the average age of the respondents was 32 years, indicative of a young and dynamic workforce. This youthful demographic is crucial for the demanding nature of PHC roles (15).

The youthful profile of AMO U29 underscored a burgeoning workforce, albeit limited experience, as many reported less than 5 years in the field. AMO under 29 years were the most represented group, highlighting the youthfulness of the workforce. A significant proportion reported less than 5 years of experience, suggesting a need for Continued Professional Development (20,16). According to Seligman et al. (15), the best practices in PHC, including effective airway management techniques. Their work supports the continuous improvement of training programs to keep PHC providers well-prepared for airway emergencies. Moreover, Nurumal et al. found variability in the competency levels of PHC providers. Their mixed-

method approach indicates that not all personnel are equally prepared, which can lead to inconsistent airway management practices (18).

This denotes a reservoir of emerging talent requiring ongoing professional development. The uptake of PHAM courses was significant, yet a practice discrepancy was noted, with a split between practice and reservations about training effectiveness, highlighting a need for continuous educational improvement by Mehmood et al (16). A considerable uptake of PHAM courses among respondents was observed, indicating a commitment to skill enhancement (1). An overwhelming majority displayed a positive attitude towards PHAM, reflecting a favourable perspective on this aspect of care (3). Despite positive attitudes, practice levels varied significantly, pointing to a possible disconnect between attitude and practice (4). Factors Influencing Practice toward PHAM was Participation in PHAM courses and comprehensive training were key factors in enhancing practice levels, emphasizing the value of structured education programs (5).

Respondents generally held positive attitudes towards PHAM, though practice levels varied, suggesting a disconnect between attitude and practice. This highlights a potential gap in training effectiveness (2). Training and comprehensive education were identified as key factors in boosting practice, underpinning the critical role of structured learning and skill acquisition in enhancing PHC proficiency. Lee et al. (31) identifies factors contributing to organizational resilience in emergency response organizations. Their findings suggest that robust training programs, strong leadership, and effective communication systems are crucial for enhancing the resilience and effectiveness of pre-hospital care providers, including those involved in airway management. They also highlight challenges such as resource constraints and variability in training quality, which can undermine organizational resilience and the effectiveness of PHC providers.

Educational backgrounds varied, with the majority holding certificate or diploma qualifications, yet also including bachelor's and master's degree holders, illustrating a broad educational spectrum. A significant number of respondents held certificate or diploma qualifications, with a noteworthy presence of bachelor's and master's degree holders. This diversity in educational attainment reflects a broad spectrum of knowledge and skills within the workforce (17). Additionally, the notable emphasis on Certificate/Diploma holders underscores the prevailing educational paradigm within the PHC domain, with only a minority pursuing higher academic credentials such as bachelor's and master's degrees. This educational profile suggests a pragmatic focus on vocational training tailored to immediate field applicability. Anderson et al. revised Bloom's Taxonomy, providing a framework for learning, teaching, and assessing (27). This taxonomy can be applied to PHAM training programs to ensure comprehensive education from degree and above for AMOs that covers all necessary cognitive and practical skills. According to Malaysian Qualification Accreditation (37) outlines program standards for medical and health sciences, which may not be uniformly applied across all educational institutions. This can result in variations in the competency levels of pre-hospital care providers, affecting the quality of airway management.

The preponderance of Malay ethnicity within the sample reflects Malaysia's broader demographic composition. Ethnically, while Malay participants dominated, the diversity of Malaysia's multicultural society was reflected through the inclusion of Chinese, Indian, and other ethnic groups. The study noted a predominance of the Malay ethnic group, with substantial participation from Chinese, Indian, and other ethnicities. According to DOSM, this diversity mirrors the multicultural composition of Malaysia (25,33). The factors associated with attitude using MLR in this study, AMO who attended PHAM course has 9 odds of having positive attitude compared to AMO who never attended PHAM course when factor of adequate training was adjusted in the MLR analysis. However, AMO who received adequate training had significant association with positive attitude in univariate analysis but when adjusted with attended PHAM course factor was found insignificant. The identified gaps in training and inconsistencies in the competency levels among PHC provider. This points to the need for standardized training and regular skill assessments to ensure uniform competency levels (18). Hafis et al. highlighted challenges in the implementation of advanced PHAM such as CPAP, due to resource limitations and varying levels of training among PHC provider (22). This indicates the need for systemic improvements and consistent training across all levels of pre-hospital care.

The survey's outcomes highlighted a positive attitude towards PHAM among PHC providers. This suggests that the AMOs are generally receptive to engaging in PHAM practices, underscoring the potential for enhancing PHC delivery through targeted training initiatives. Moreover, a substantial proportion of AMOs who had attended PHAM courses demonstrated a significant positive attitude, reinforcing the efficacy of these educational interventions. Lee and Harrison assessed safety culture in nuclear power stations, highlighting that strong safety cultures are essential for effective practice (30,31). This parallels the need for a robust safety culture in pre-hospital care to minimize risks associated with PHAM.

While the factors associated with practice using MLR in this study, an AMO who received adequate training has 3 odds of having high practice compared to AMO who never received adequate training when factor of attended PHAM course was adjusted in the MLR analysis. Crucially, factors influencing practice, attendance at the PHAM course and receipt of comprehensive training emerged as pivotal determinants augmenting practice levels among PHC providers in Perak, underscoring the indispensable role of structured education and skill acquisition programs. According to Wang et al. (34) define the learning curve for paramedic student endotracheal intubation. They found that with adequate practice and experience, paramedic students significantly improve their intubation success rates, highlighting the importance of hands-on training in developing airway management skills.

The practice levels among respondents were notably lower than the attitude levels, indicating potential gaps in self-practice regarding PHAM execution. This disparity underscores the need for further emphasis on practice-building measures within the PHC training paradigm. The significant association between adequate training and high practice levels reinforces the critical role of comprehensive and robust training programs in instilling practice among PHC providers. Other study by Abd Samat et al. (39) found that emergency healthcare workers in Malaysia had adequate knowledge and practice in managing airways and resuscitation of suspected COVID-19 patients. This demonstrates the effectiveness of

targeted training programs in boosting healthcare workers' practice and competence in critical airway management scenarios.

The study presents critical insights into the demographics, attitudes, and practice levels of PHC providers in Perak, Malaysia. While positive attitudes towards PHAM are evident, addressing the practice discrepancy and ensuring ongoing educational support are vital for improving PHC quality. The significance of structured training and mentorship in boosting provider practice and proficiency is underscored (8,18).

Conclusion

In conclusion, our study underscores a favourable disposition in the attitude domain than practice domain among PHC providers. Additionally, characteristics such as participation in PHAM courses significantly impact fostering a positive attitude. Moreover, individuals who considered their training sufficient demonstrated high practice levels. It is suggested that engagement in PHAM courses be augmented, and consistent participation in PHAM simulation training is essential to cultivate favourable attitudes and bolster self- practice among PHC providers.

Study Limitations

This study on PHC providers in Perak, Malaysia, has limitations due to the small number of enrolled providers and the limited data collected due to the COVID-19 pandemic. The study only measured self-perception of attitude and practice levels, not examining the competency of PHC providers. Future studies should involve a larger sample size or a more dispersed geographical location to confirm the results.

Recommendations

Multicentre studies should investigate PHC providers' attitudes and practice levels in PHAM. We suggest an intervention trial to be conducted in the future to determine the causal effects of training on PHAM. Topics include competencies for safe PHAM, type-specific studies, and pharmacologically assisted PHAM in PHC settings.

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Ethics of Study

Ethical approval was obtained from the Human Research Ethics Committee, USM (JEPeM): USM/JEPeM/20050253 and Medical Research & Ethics Committee, MOH, National Medical Research Register (NMRR): NMRR-19-3593-49630 (IIR). Written consent was obtained from the participants, and they received written information about the study before data collection began.

Conflict of Interest

None.

Funds

None.

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