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Respiratory Therapy Using Lung Ultrasonography: A Worldwide Reflective Survey

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Abstracts

Lung ultrasonography (LUS) has been used extensively in acute care settings for over 20 years as a noninvasive point-of-care diagnostic tool to evaluate the presence and severity of various lung disorders. When it comes to caring for patients on ventilation and other patients who need respiratory support, respiratory therapists (RTs) are essential. Despite the importance of RTs' work in acute care, the inclusion of LUS in their scope of practice has not received enough attention. The purpose of this international cross-sectional survey was to assess RTs' knowledge, attitudes, and practices regarding lung ultrasonography.

Methods: Using a questionnaire-based study instrument, RTs from all over the world participated in this observational cross-sectional study. 514 RTs in all answered every question and were taken into account for statistical analysis. To determine the significance of the data, descriptive statistics, analysis of variance, Fisher's exact, Chi-square, Bonferroni post-hoc analysis, and binomial logistic regression analyses were conducted.

In conclusion: RTs view the integration of LUS into their clinical practice favorably. Professional RTs may find it easier to master diagnostic skills and broaden their scope of practice if they receive more structured training and LUS modules are included in the respiratory therapy school curriculum.

1. Introduction

Lung ultrasonography (LUS) has become a vital tool in the evaluation and treatment of critically ill patients over the last 20 years.LUS is a noninvasive, quick, portable, radiation-free imaging technique that enables real-time assessment of the lungs and associated structures. Numerous studies, including meta-analyses, that contrasted LUS with chest X-rays indicated that it had comparable specificity and higher sensitivity in identifying conditions like pulmonary edema, pneumonia, pleural effusion, and pneumothorax. Additionally, LUS offers critical bedside information on respiratory complications, ventilation distribution, and lung aeration for patients on ventilators. Additionally, a thorough ultrasonographic approach that includes diaphragmatic ultrasound, echocardiography, and LUS provides detailed information that may aid clinicians in customizing ventilator settings for these patients (Lerchbaumer , 2021).

In addition to acute care settings, LUS is useful in evaluating the presence and severity of various related lung conditions in other related clinical settings, such as cardiology and rheumatology. By combining LUS with conventional echocardiography, cardiologists can diagnose and treat both acute and chronic cardiopulmonary disorders more easily and obtain an integrated cardiopulmonary analysis. The diagnosis and treatment of rheumatoid diseases, such as interstitial lung diseases, are significantly aided by LUS, which was also found to have a high diagnostic accuracy and a significant correlation with the high-resolution computed tomography findings (Ebrahimi , 2014).

Healthcare practitioners who specialize in the assessment and management of patients of various ages who present with respiratory and associated disorders are known as respiratory therapists (RTs). Depending on the needs, they can provide a broad range of diagnostic and therapeutic procedures because they have the necessary knowledge, expertise, and capacity. The value of RTs and RT-driven care in enhancing patient outcomes and lowering morbidities is supported by evidence. It's also noteworthy that, when RT-driven care was compared to physician-directed care, a decrease in costs and a rise in adherence to established practice guidelines were noted without any increase in adverse events (Lichtenstein , 2004).

As one of the main providers of mechanical ventilation, RTs are essential in diagnosing and treating a variety of ventilator/ventilation-related conditions, and LUS may help them diagnose a range of respiratory abnormalities, including pulmonary edema, pneumothorax, and others. However, it is not currently considered a standard practice in the field of respiratory therapy (Maw, 2019; Ye X, 2015).

It is clear that a worldwide standardization of the use of LUS in the scope of practice of respiratory therapists has not yet been reached, despite the growing trend of its potential in the diagnostic and therapeutic areas of respiratory care. In order to establish a baseline for their perceptions of LUS knowledge, attitudes, and practices, the first cross-sectional international survey created especially for RTs was conducted.

2. Methods:

Research design: Through emails, professional social networks, respiratory therapy professional societies, and RTs from different nations, this observational cross-sectional survey used snowball sampling techniques. The survey was directed at RTs of all sexes, ages, and educational backgrounds across the globe. We used Google Forms, an online survey platform, to create the questionnaire.

Participants in the study: RTs were the intended participants; there were no limitations on their age, sex, educational background, work experience, or nation of employment. All of the participants gave their informed consent. The study included RTs who consented to participate and were employed in clinical and academic settings. The study automatically excluded RTs who refused to participate and those who did not finish the survey.

Prognostic aspects of Respiratory Disorders:

With the development of new medically related technologies, RTs' areas of practice have been growing. Particularly in acute care settings, LUS seems to be a promising tool for the diagnosis and prognosis of respiratory disorders. Given the critical role RTs play in acute care settings, it is advised that RTs become knowledgeable about and proficient in LUS. It is hypothesized that RTs trained in LUS, who serve as the primary caregivers for ventilated patients, will benefit in particular ways, such as facilitating weaning, optimizing positive-end expiratory pressure in patients with worsening acute respiratory distress syndrome, and identifying pneumothorax early (Via G, 2010).

The RTs with master's and doctoral degrees in our study had high positively attributed responses in the knowledge and practice domains. This matched the number of years they have had clinical exposure. This illustrates how the learning path in any field, including LUS, advances from fundamental ideas and methods to more complex concepts and abilities. The LUS learning curve usually begins with a technical exploration of the equipment and the acquisition and interpretation of basic ultrasound images, just like any other technique. As they gain experience, they might advance to more complex methods, like evaluating particular respiratory disorders or guiding procedures with ultrasound (Chiumello, 2018; Dubé, 2017).

Performance-Based Assessment On Real Patients:

Our study's practice-based responses are consistent with another study in which trainees, including RTs, participated in a didactic session that included a video lecture, a hands-on session at the patient's bedside, and practical evaluations of LUS. After a few tests and supervisions, nearly 80% of the trainees were able to distinguish between normal lungs and lungs with interstitial-alveolar syndrome, demonstrating the value of exposure and training. Performing supervised exams or performance-based assessments on actual patients is the most thorough method of obtaining practical experience in LUS. This can give you invaluable experience dealing with patients and putting your newly acquired knowledge and abilities to use (Lichtenstein, 1997; Mongodi , 2016).

Practice LUS:

The obstacles to practicing LUS were one area of concern. Notwithstanding the wide range of demographic information in our study, half of all respondents concurred that there might be obstacles preventing RTs from practicing LUS, while the other half held differing views. Potential obstacles to RTs' participation in LUS practice, as indicated by the literature, include a lack of formal training and curriculum, a lack of mentors and resources, time constraints, a lack of accreditation or standardization, practice resistance, and a lack of confidence, despite the survey's failure to subcategorize the types of anticipated barriers (Bianco , 2017).

Investing in equipment and resource sharing, offering integrated training sessions and hybrid self-paced programs, putting in place standardized training guidelines and customized certification programs, providing evidence-based education and inclusive approaches, offering regular practice opportunities, and offering mentorship are some strategies to get past these obstacles. Competency evaluations with the support of the relevant professional societies or

regulatory bodies are necessary if RTs still face obstacles to practice despite having official certification (Song G, 2016).

The use of non-physician healthcare professionals like paramedics, physiotherapists, and nurses in ultrasonography is supported by evidence, and some articles highlight the necessity of adding LUS to RTs' scope of practice. These articles restated that, given the nature of the work, providing RTs with LUS knowledge will be beneficial in raising the standard of patient care and safety (Stoller, 2001).

3. Recommendations:

- Future research is required. The purpose of this study was to investigate the prospects and potential of RTs in the practice of LUS. The literature that is currently available indicates that there are significant gaps even though LUS obviously affects respiratory care practices. It is strongly advised that future studies concentrate on randomized controlled academic and clinical trials that incorporate LUS as a practical tool for RTs. In order to suggest and standardize the training and competency requirements in LUS for RTs, multicentered prospective studies are also required. We emphasize the necessity of incorporating LUS modules into respiratory therapy curricula worldwide, as it all begins at the school level.

- Strengths and limitations of this study: This is the first global survey to investigate RTs' subjective and objective reactions to LUS. Since only certified respiratory therapy professionals were surveyed, the answers could be interpreted as their overall opinion of this imaging tool. In contrast to the total number of RTs worldwide, we believe that the number of participants in this study is small. Since the practice of LUS by RTs is still relatively new in many parts of the world, we assume that this is because of the topic's unique nature. A bias of interest in the subject may have resulted from this. Given the increase in survey-based research activities brought on by the coronavirus disease 2019 pandemic, survey fatigue may be another factor.

4. Conclusion:

This study indicated that RTs see value in adding a thorough ultrasound training module related to respiratory care to the current respiratory therapy curricula worldwide, anticipating professional growth and improved patient outcomes. According to this study, practicing RTs may benefit from a structured respiratory-related ultrasound training module that enhances their clinical and technical decision-making abilities for safer practice. Building on this more comprehensive understanding, more research on LUS in particular nations and healthcare authorities is necessary to comprehend the subtleties of RT practice in those settings. There are still obstacles in the way of RTs routinely using LUS ultrasonography. However, in order to reflect the benefit-risk ratio of including RTs in the imaging taskforce, the participation of medical education departments, credentialing and privileging committees, and professional organizations of the respective nations is crucial.

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