

Perspective

Development of Physiotherapist-Led Diagnostic Lung Ultrasound in Hong Kong

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Professional Developments in Critical Care Physiotherapy in Hong Kong

In the past 10-15 years, major developments in critical care physiotherapy have been witnessed in Hong Kong (HK), such as the provision of early mobilization and ventilator hyperinflation to the critically ill in Intensive Care Units (ICUs) with the aims of avoiding ICU-acquired weakness, weaning the patients off ventilators and shortening the patients' hospitalization time.

In respect of the development of early mobilization in ICU, protocols have been established. The benefits brought to patients by these protocols are well recognized and appreciated by medical practitioners in many local ICUs. Relevant resources have been increasingly allocated to this area. Equipment, staff training and manpower are improved.

Diagnostic Lung Ultrasound - Another Niche Area in Critical Care Physiotherapy

Professor Daniel Lichtenstein, one of the pioneers in point of care ultrasound (POCUS) in critical care, once acknowledged that physiotherapists should acquire ultrasound imaging skills. The mastering of such skills would change many aspects of the physiotherapy protocols as the imaging result can be seen real-time [1].

Leech et al. (2015) examined the diagnostic performance of diagnostic Lung Ultrasound (LUS) which investigated pleura, lung, parenchyma and diaphragm, compared with auscultation and chest X-ray. It was found that LUS, due to its superior sensitivity and specificity, would enable physiotherapists to make timely and accurate diagnosis of acute pulmonary pathologies at bedside and determine if the pathology is amenable to physiotherapy interventions. Le Neindre et al. (2016) emphasized on how physiotherapists could apply LUS in daily practice and they commented that LUS was a potential tool for physiotherapists as it performed better than auscultation and chest X-ray. It therefore should be considered as an outcome measure and used in making informed clinical decisions. Hayward and Janssen (2018) reviewed that the use of LUS among physiotherapists on a broad range of pathologies and patient populations was gaining popularity. They also found that diaphragm thickness and mobility

were the most frequently investigated outcome measures adopted by physiotherapists.

In addition to being more accurate in making real-time differential diagnosis between pneumothorax, pleural effusion, lung consolidation and lung collapse and being able to be done at bedside due to its portability, LUS is non-invasive and fast to perform. It does not emit any ionizing radiation but allows serial investigations [2]. LUS could be applied in most patient populations but it could be difficult in some circumstances such as over surgical emphysema, dressings, wounds, burns and in obese patients [2].

With the use of LUS in ICUs, critical care physiotherapists can guide, monitor and evaluate before, during and after their interventions to see whether they are yielding improvements, for example, using manual or ventilator hyperinflation and patient mobilization in re-expanding a collapsed lung, and using LUS as visual feedback in deep breathing exercise in facilitating better diaphragm mobility etc. [2]. After all, LUS enables physiotherapists to make interventions more targeted and effective.

Adopting Diagnostic Lung Ultrasound in Physiotherapy Practice

Diagnostic ultrasound has traditionally been applied within the scope of practice of medical practitioners. However, review showed that LUS has been gradually adopted by physiotherapists specialized in cardiopulmonary around the world and there has been a dramatic increase in its use during the coronavirus disease 2019 (COVID-19) pandemic [4,5].

From the scoping review conducted by Hayward and Janssen (2018), it was shown that the use of physiotherapist-led LUS was growing in the United Kingdom (UK), Australia, Brazil, South Africa, India and South-east Asian countries e.g. Japan, Singapore and Republic of Korea. In the UK, diagnostic imaging has been added into the physiotherapy scope of practice, and related training programmes, protocols and accreditation have been well developed and implemented. The UK physiotherapy community is also proud of their mentorship system and within-profession self-accreditation capability about the use of physiotherapist-led LUS.

Hayward et al. (2019) conducted a national survey on physiotherapists and identified the most common concerns regarding integrating LUS safely into physiotherapy practice. These concerns included team support, machine/training cost and availability, time pressure and mentor availability [6]. Solid solutions needed to be found to avoid progress limitation.

Diagnostic Lung Ultrasound in Hong Kong - Where We Are and What We Can Do

Development of physiotherapist-led LUS in local settings

is still at a very preliminary stage. The availability of competent physiotherapists in the use of LUS is very limited in HK. This is due to a lack of knowledge, interest and understanding within the critical care physiotherapist community in the value of LUS, and the unavailability of mentors and relevant training courses in HK. Generally, there is a lack of LUS-equipment designated for physiotherapists to use. No local governance and policy available to guide physiotherapists to the accreditation of implementing LUS in clinical situations is another challenge to the local profession.

To catch the global trend and work for a better physiotherapist-led LUS development in HK, there are several important things we should do. First, a HK wide physiotherapy working group should be established in setting up timelines and priorities.

Second, even though hands-on training by oversea experienced physiotherapists have ceased since the outbreak of COVID-19, online training could be proactively arranged with the provision of local experts' back-up.

Third, LUS education to the local critical care physiotherapy teams, ICU nursing and medical teams and management teams should be largely increased for better communication on how physiotherapists will use LUS in practice. By doing these, the resources allocated to the purchase of LUS-equipment will hopefully be growing.

Last, when the number of competent physiotherapists and culture of using LUS in practice gradually grow, local governance and policy to guide physiotherapists to the accreditation of implementing LUS in clinical situations should then be discussed and worked out.

Conclusion

LUS has the potentials to enhance the ability to differentially diagnose respiratory pathologies, aid respiratory assessment and support clinical reasoning. With the foreseeable barriers, it would be another long battle for the critical care physiotherapy team in HK, just like the development of early mobilization in ICUs. However, to fight for the best to benefit patients, the benefits of adopting physiotherapist-led LUS should be recognized and appropriate steps should be taken to overcome its barriers.

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