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POPULARITY OF LUNG ULTRASOUND IN POLAND - NATIONWIDE ONLINE SURVEY

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ABSTRACT

Introduction: With the beginning of the COVID-19 pandemic, lung ultrasound has become a very popular technique, commonly used in hospitals. In recent years, we have observed a significant increase in the number of scientific publications on this technique. This paper attempts to examine the popularity of lung ultrasound in Poland among doctors of various specialties.
Methods: The study included an online survey that was modular, which means it was rebuilt depending on the answers provided. Responses could be provided in the time frame of November 2022-June 2023. The questions included variables such as years of work, region of Poland, specialization, and the use of lung ultrasound in everyday practice, including in selected clinical situations.
Results: The survey received 125 responses from almost all voivodeships (15/16). Among the surveyed physicians, 64% declared using lung ultrasound in their clinical practice. Lung ultrasound is most popular among physicians with up to 10 years of professional practice, while it is least popular among physicians with more than 25 years of practice. In the case of pneumonia diagnostics, most lung ultrasound users would perform an additional X-ray examination (49/80). Most of the surveyed indicated that lung ultrasound was an important examination during the COVID-19 pandemic. Moreover, it is a future-proof study that should be introduced into the medical curriculum.
Conclusions: Lung ultrasound in Poland is a very popular technique, reaching up to 80% among young doctors. It is important to include this technique in diagnostic recommendations for various lung diseases and in the curriculum during medical studies. This is most likely the first publication investigating the popularity of lung ultrasound in Poland.

KEYWORDS

Lung Ultrasound, Survey, Ultrasound in Poland, Ultrasonography

CITATION

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Introduction.

Lung ultrasound (LUS) has experienced a real boom with the beginning of the COVID-19 pandemic, dynamically gaining popularity. [1] For many years, it was believed that lung imaging was impossible due to their filling with air, but thanks to numerous studies and meticulous observations, it has been shown that the artifacts generated by the ultrasound device allow the development of certain patterns that correlate well with various pathologies. This type of indirect lung assessment currently allows for the diagnosis and monitoring of numerous pathologies such as: pneumonia, pulmonary edema, pulmonary embolism, pleural effusion, etc. [2] Compared to classic lung imaging methods such as X-ray or computed tomography, thanks to ultrasound, we do not have to expose the patient to harmful ionizing radiation, which additionally allows us to more frequent monitoring of the evolution of changes in the lungs without unnecessary risk. A significant advantage of ultrasound is the high mobility of ultrasound devices, which allows them to be used not only in a dedicated laboratory, but also at the patient's bedside. [3]

The above-described features of LUS proved to be extremely valuable during the COVID-19 pandemic, as they allowed for providing professional medical care to patients, even in situations where the healthcare system was seriously overloaded with the number of patients. Since then, we can also observe a significant increase in the number of scientific publications on this technique, and above all, we can observe its increasingly frequent use in everyday clinical practice.[4] The fields that particularly often use this technique include: anesthesiology, emergency medicine, intensive care, family medicine and internal diseases - a wide range of diagnosable pathologies and their common occurrence allows for its wide implementation in virtually every field of medicine.[5]

Based on published scientific papers, statistically LUS is most popular in the USA, UK and Italy, however a significant upward trend is also observed in other regions of the world.[6]

In connection with the above, the subject of this work is to examine the popularity of LUS in everyday clinical practice in Poland using an online survey taking into account, among others, such factors as specialization, region, years of clinical practice and included questions regarding the use of this technique in selected clinical situations and the reasons for such a decision.

Methods:

The study was aimed at professionally active physicians and was conducted in the form of an electronic survey available online, in the distribution of which some Medical Chambers and Scientific Societies dealing with ultrasonography. The results of which were collected in the period November 2022 - June 2023. The survey was designed in a modular manner, i.e. it was rebuilt depending on the answers provided, in order to obtain the largest possible number of answers, for different answer variants. Depending on the answer variants, the respondent answered 10-13 questions. Simple statistical tools of the Microsoft Excel system were used to compile and process the data.

Results:

The survey received a total of 125 responses from doctors from almost all of Poland (15/16 provinces), with the largest number of responses from the following voivodeships: Opole (29/125; 23.2%), Lubusz (21/125; 16.8%) and Lower Silesia (12/125; 9.6%).

Depending on professional experience, the dominant group were successively doctors with more than 25 years of practice (29/125; 23.2%), between 5-10 years of practice (28/125; 22.4%) and less than 5 years of practice (27/125; 21.6%). In further analysis of the survey, the basic division used was dividing the respondents into groups: LUS Users (80/125; 64%) and LUS Non-Users (45/125; 36%). The LUS Users in the individual groups of work experience are listed in Tab. 1, while the ways of using LUS are listed in Tab. 2. LUS Users and Non-Users were asked to mark the subjective advantages and disadvantages of LUS, their answers are listed in Tab. 3. and Tab. 4 The next question asked LUS Users to answer the question:”In the diagnosis of infectious pneumonia (patient with clinical symptoms) you use lung ultrasound, the image of which shows all the features of this disease. Do you still order a chest X-ray? ”, in which 49/80 (61.3%) of the respondents would like to supplement the diagnostics with an X-ray examination, the reasons for such a decision are listed in Tab. 5. In the second clinical question LUS Users were asked:”In the lung ultrasound examination you find all the signs of the presence of fluid in the pleural cavity. Will you also perform a chest X-ray? ”. 75% of the respondents do not see the need to supplement the diagnostics with an X-ray examination. In the Nos-Users group, the main reason for not practicing LUS was asked, and the main answer was the specificity of work that does not require the use of this test (20; 44.5%). All answers to this question are summarized in Tab. 6. At the end of the survey, both groups had to answer 3 short questions about the usefulness of LUS during the COVID-19 pandemic, the future importance of the lung ultrasound examination and the need to introduce its basics already at the stage of medical studies. The answers of both groups are summarized in Table 7.

Table 1. Age structure of respondents with percentage of lung ultrasound users

Years of clinical practice	Responses	LUS Users	%
<5	27	23	85%
5-10	28	22	79%
11-15	19	13	68%
16-20	10	7	70%
21-25	12	7	58%
>25	29	8	28%

LUS – lung ultrasound

Table 2. Main directions of application of lung ultrasound by its users

Diagnostics	Monitoring	POCUS/Emergency medicine
74 (92,5%)	62 (77,5%)	55 (68,8%)

POCUS- Point of Care Ultrasound

Table 3. Comparison of subjective advantages indicated by LUS Users and LUS Non-Users

	No. of responses	% of responses	No. of responses	% of responses
Wide availability of ultrasound devices; possibility of immediate examination	60	75%	19	42,2%
Ease of performing and interpreting the test	46	57,5%	16	35,6%
A large number of literature reports	20	25%	10	22,2%
Large number of courses and training offers	17	21,3%	4	8,9%
Non-invasive	71	88,8%	39	86,7%
Possibility of frequent treatment monitoring	68	85%	38	84,4%
Development of Polish guidelines: "Recommendations for Lung Ultrasound in Internal Medicine" Buda N. et al Diagnostics 2020	9	11,3%	2	4,4%
I don't see any advantages	0	0%	1	2,2%
I don't know/I have no opinion	0	0%	3	6,7%

LUS – lung ultrasound

Table 4. Comparison of subjective disadvantages indicated by LUS Users and LUS Non-Users

Difficult access to ultrasound machine	13	16,3%	12	26,7%
Difficulty in performing and interpreting the examination	13	16,3%	8	17,8%
Too few literature reports	5	6,3%	1	2,2%
A small number of courses and trainings on offer	5	6,3%	5	11,1%
No dedicated books/textbooks	11	13,8%	5	11,1%
Lack of official guidelines from the largest Polish scientific societies	25	31,3%	5	11,1%
I don't see any flaws	32	40%	9	20,0%
I don't know/I have no opinion	3	3,8%	13	28,9%

LUS – lung ultrasound

Table 5. The arguments for performing an additional X-ray examination despite a certain diagnosis of pneumonia in LUS by LUS Users

Despite all this, I am not sure about the diagnosis	20	40,8%
I consider a chest X-ray to be a more reliable diagnostic method.	15	30,6%
I want to follow the official guidelines	15	30,6%
I don't want to risk being accused of medical malpractice.	19	38,8%
I believe that such a diagnosis cannot be made using lung ultrasound.	4	8,2%
I currently have no knowledge on how to diagnose infectious pneumonia using ultrasound.	7	14,3%

LUS – lung ultrasound

Table 6. Reasons for LUS Non-Users not to perform the LUS test

No access to ultrasound machine	9	20%
The specificity of the work does not require the use of this test.	20	44,4%
I don't trust this method	1	2,2%
I do not have sufficient knowledge and skills regarding this study	18	40%
In my workplace, it is not recommended to perform this test	3	6,7%
Lack of official guidelines from the largest Polish scientific societies	4	8,9%

LUS – Lung ultrasound

Table 7. Comparison of LUS Users and LUS Non-Users' responses to short survey questions

Question	Answers	Users		Non-Users	
		No	%	No	%
Do you think that lung ultrasound was a useful examination during the COVID-19 pandemic?	Yes	62	77,5%	23	51,1%
	No	6	7,5%	7	15,6%
	I don’t know; I have no opinion	12	15%	15	33,3%
Do you think that lung ultrasound is a important in everyday medical practice?	Yes	77	96,3%	34	75,6%
	No	0	0%	2	4,4%
	I don’t know; I have no opinion	3	3,7%	9	20%
Do you think that lung ultrasound should be introduced into the medical school curriculum?	Yes	74	92,5%	33	73,3%
	No	3	3,7%	6	13,3%
	I don’t know; I have no opinion	3	3,7%	6	13,3%

LUS – lung ultrasound

Discussion

Transthoracic lung ultrasound has been controversial among physicians for many decades, due to the physical limitations of imaging highly aerated tissues such as the lungs. Regardless of the resistance, many physicians have developed this imaging method, seeing significant correlations between artifacts generated by the ultrasound machine and a given lung pathology.[2] Thanks to diligent work and great effort, it has been possible to gather a scientific database proving the validity and possibilities of chest ultrasound examination.[7]

During the COVID-19 pandemic, due to the rapid increase in infections and numerous logistical problems worldwide, lung ultrasound has proven essential in bedside diagnostics and monitoring of pneumonia caused by SARS-CoV2. In a very short time, numerous recommendations were developed on how to use LUS in the daily functioning of departments treating patients with COVID-19, while the technique itself began to gain great popularity.[8][9][10] In order to assess how widely LUS has been implemented in Polish hospitals [11], an online survey was conducted, which empirically allowed us to prove the wide popularity of this technique. In the analysis of the responses, it should be noted that LUS is particularly popular among the group of doctors who have been working in the profession for up to 10 years, which is a positive phenomenon of interest in new diagnostic techniques and a positive perspective for their further development.

It was the least popular in the group of doctors with very rich medical experience >25 years of professional practice, which may be related to their strong attachment to traditional radiological methods, in which they have the greatest experience. Attention should be paid to the answers to clinical questions related to pneumonia and free fluid in the pleural cavity. In the case of pneumonia, most of the surveyed doctors would additionally perform an X-ray examination. Among the reasons for such a decision, apart from the desire to be sure of one's diagnosis and to place greater trust in the traditional X-ray examination, we also see reasons related to the need to follow official guidelines and recommendations, which often describe LUS sparsely. It should be emphasized that numerous studies and meta-analyses have shown a very high sensitivity and specificity of LUS in the diagnosis of pneumonia, often exceeding the traditional X-ray examination. Numerous guidelines have also been developed, based on the highest quality scientific research, which recommend and justify the validity of relying on LUS in the diagnosis of pneumonia, and also describe situations in which it is particularly justified to supplement the tests with other radiological methods.[12][13]

When asked about the subjective advantages and disadvantages of LUS, the answers of all respondents were relatively similar, because to a large extent they concerned quite universal features of ultrasound examinations, not necessarily exclusive to LUS. In short questions about the usefulness of LUS in the COVID-19 pandemic, its importance in everyday practice and proposals for implementation in the curriculum at university, the vast majority of respondents answered affirmatively, which is particularly positive in terms of further development of this technique and its further teaching among medical students. Respondents were also asked to indicate their medical specialization, because this allows for a more detailed analysis, in terms of popularity and applications, especially in the case of specializations in which LUS is a tool that would be relatively rarely used, e.g. orthopedics or psychiatry.

In the medical literature, several surveys have been conducted on the popularity of LUS, mainly in Italy and China. Italian publications focused on examining the frequency of LUS use in neonatal and intensive care units. One of the studies [14] examining the use of LUS in neonatal intensive care units found that it had been implemented in about 82% of such units, and in a survey extended to Europe [15], it was used by 20–98% of units, depending on the country. In a large survey conducted in China [16] (514 responses), the authors focused mainly on the needs related to education, where 99.2% of surveyed respiratory specialists declared the need to learn this technique, with only 12.3% receiving appropriate training. Similarly, in a Spanish [17] publication covering rheumatologists and pulmonologists (total 135 responses), only 35.8% of respondents use LUS in their daily practice.

Determining the exact number of LUS users is extremely difficult and is related to many factors influencing the final results, but nevertheless it allows for empirical determination of a certain general trend in the popularity of a given method and changes in its fluctuation.

Conclusions

In the survey, 64% of respondents (80/125) declare the use of LUS in everyday clinical practice. It is especially popular among young doctors with up to 10 years of clinical experience, reaching up to 85%. An important issue is the inclusion of LUS in recommendations for the diagnosis and monitoring of lung diseases, which will probably contribute to an even greater increase in its popularity. The respondents agreed on the usefulness of this test during the COVID-19 pandemic and consider it important in everyday clinical practice, which is why it should be introduced into the curriculum of medical studies.

Disclosure

Author's contribution:

Conceptualisation: Rafał Rajski
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REFERENCES

1. Boccatonda A., D'Ardes D., Tallarico V., Guagnano M.T., Cipollone F., Schiavone C., et al. Role of Lung Ultrasound in the Detection of Lung Sequelae in Post-COVID-19 Patients: A Systematic Review and Meta-Analysis. J Clin Med. 2024 Sep 21;13(18):5607. doi: 10.3390/jcm13185607.
2. Radzina M., Biederer J. Ultrasonography of the Lung. Rofo. 2019 Oct;191(10):909-923. English. doi: 10.1055/a-0881-3179.
3. Miller D.L., Abo A., Abramowicz J.S., Bigelow T.A., Dalecki D., Dickman E., et al Diagnostic Ultrasound Safety Review for Point-of-Care Ultrasound Practitioners. J Ultrasound Med. 2020 Jun;39(6):1069-1084. doi: 10.1002/jum.15202.
4. Musa M.J., Yousef M., Adam M., Wagealla A., Boshara L., Belal D., et al. The Role of Lung Ultrasound Before and During the COVID-19 Pandemic: A Review Article. Curr Med Imaging. 2022;18(6):593-603. doi: 10.2174/1573405617666211006122842.
5. Pereira R.O.L., Convissar D.L., Montgomery S., Herbert J.T., Reed C.R., Tang H.J. et al. Point-of-Care Lung Ultrasound in Adults: Image Acquisition. J Vis Exp. 2023 Mar 3;(193). doi: 10.3791/64722.
6. Long L., Zhao H.T., Zhang Z.Y., Wang G.Y., Zhao H.L. Lung ultrasound for the diagnosis of pneumonia in adults: A meta-analysis. Medicine (Baltimore). 2017 Jan;96(3):e5713. doi: 10.1097/MD.0000000000005713.
7. Lichtenstein D.A. Lung ultrasound in the critically ill. Ann Intensive Care. 2014 Jan 9;4(1):1. doi: 10.1186/2110-5820-4-1.
8. Jackson K., Butler R., Aujayeb A. Lung ultrasound in the COVID-19 pandemic. Postgrad Med J. 2021 Jan;97(1143):34-39. doi: 10.1136/postgradmedj-2020-138137.
9. Norbedo S., Blaivas M., Raffaldi I., Caroselli C. Lung Ultrasound Point-of-View in Pediatric and Adult COVID-19 Infection. J Ultrasound Med. 2021 May;40(5):899-908. doi: 10.1002/jum.15475.
10. Alsharif W., Qurashi A. Effectiveness of COVID-19 diagnosis and management tools: A review. Radiography (Lond). 2021 May;27(2):682-687. doi: 10.1016/j.radi.2020.09.010.

11. Skoczyński S., Buda N., Mendrala K., Górecki T., Kucewicz-Czech E., Krzych Ł., et alLung ultrasound may improve COVID-19 safety protocols. J Thorac Dis. 2021 May;13(5):2698-2704. doi: 10.21037/jtd-21-295.
12. Demi L., Wolfram F., Klersy C., De Silvestri A., Ferretti V.V., Muller M., et alNew International Guidelines and Consensus on the Use of Lung Ultrasound. J Ultrasound Med. 2023 Feb;42(2):309-344. doi: 10.1002/jum.16088.
13. Buda N., Kosiak W., Wełnicki M., Skoczylas A., Olszewski R., Piotrkowski J. et al. Recommendations for Lung Ultrasound in Internal Medicine. Diagnostics (Basel). 2020 Aug 16;10(8):597. doi: 10.3390/diagnostics10080597.
14. Corsini I., Parri N., Ficial B., Ciarcià M., Migliaro F., Capasso L., et al. Lung ultrasound in Italian neonatal intensive care units: A national survey. Pediatr Pulmonol. 2022 Sep;57(9):2199-2206. doi: 10.1002/ppul.26025.
15. Alonso-Ojembarrena A., Ehrhardt H., Cetinkaya M., Lavizzari A., Szczapa T., Sartorius V., et al Use of neonatal lung ultrasound in European neonatal units: a survey by the European Society of Paediatric Research. Arch Dis Child Fetal Neonatal Ed. 2024 Oct 18;109(6):660-664. doi: 10.1136/archdischild-2024-327068.
16. Liu K., Yao Y.L., Wang Y.X., Wei B.L., Li L.C., Wang Q.X., et al. A cross-sectional survey on the lung ultrasound training and practice of respiratory therapists in mainland China. BMC Pulm Med. 2022 Nov 18;22(1):425. doi: 10.1186/s12890-022-02213-6.
17. Romero-Bueno F., Rodríguez-Nieto M.J., Naredo E. Education and Use of Lung Ultrasound in Rheumatology and Pneumology in Spain: A SER-SEPAR Survey. Reumatol Clin (Engl Ed). 2022 Feb;18(2):94-99. doi: 10.1016/j.reumae.2020.10.004.