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## Virtual communication is commonly used in Finnish interstitial lung disease multidisciplinary meetings

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### ABSTRACT

Multidisciplinary meeting (MDM) is a core element in the diagnosis of interstitial lung diseases (ILD). The aim of the study was to investigate the implementation and key elements related to ILD MDMs in Finnish specialized care, which is characterized by long travel distances and a large number of small centers treating patients suffering from ILDs. An electronic questionnaire was sent to ILD experts working at five academic centers of Finland regarding the implementation of ILD MDMs with the focus on utilization of virtual communication. Responses were received from all academic centers of Finland ( $n=5$ ) whose catchment areas cover all of Finland. ILD MDMs were organized in each center approximately every two weeks and the core participants included a radiologist, respiratory physicians, junior staff, pathologist and a rheumatologist. All non-academic centers could refer their patients to be evaluated in ILD MDM of an academic center. Virtual communication was utilized by all academic centers in the implementation of ILD MDMs, being most common among small centers located in Eastern and Northern Finland. Virtual access to ILD MDM of an academic center was available in most parts of Finland, enabling small centers to benefit from the ILD expertise of academic centers.

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### KEYWORDS

Interstitial lung disease; eHealth technologies; diagnosis; pulmonary fibrosis; multidisciplinary



## Introduction

Multidisciplinary meeting (MDM) has been a core element in the diagnostics of interstitial lung diseases (ILD) for about 20 years [1]. In ILD MDM, all clinical, radiological and histopathological data are combined for a consensus diagnosis. MDM is also utilized in assessing the necessity of invasive diagnostic procedures, such as surgical lung biopsy (SLB), transbronchial lung cryobiopsy (TLCB) or bronchoalveolar lavage (BAL) [2,3]. MDM increases diagnostic confidence and is sometimes needed several times before all necessary elements are available to form the final consensus diagnosis [3–6].

MDM should include at minimum a respiratory physician, a radiologist, and a pathologist [7–9]. An international multicenter study has also reported common


attendance of nursing staff, rheumatologists and junior staff [8]. There are no official published guidelines for the implementation of a MDM. However, some suggestions concerning the core criteria for MDM have been published, e.g. by Jo et al and recently by Teoh et al. [8,9] In addition to the suggestion on the core participants, these have included proposals on the adequate number of ILD cases to develop expertise in ILD, presentation of a set of routine investigations, especially high quality high-resolution computed tomography (HRCT) images, and the provision of a diagnosis and degree of diagnostic confidence [8,9].

Finland is a country of about 5.5 million inhabitants in Northern Europe with a geographical area of 338,000 square kilometers [10]. Consequently, the population density is among the lowest in Europe. In

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<sup>†</sup>Dr. Ulla Hodgson passed away on October 4<sup>th</sup> 2022.

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Finland, all citizens have a fundamental right to comprehensive public healthcare services. The Finnish public healthcare system consists of primary care provided by local authorities in health centers and specialized care. Specialized care is organized by five university hospitals also serving as academic centers and by 15 central hospitals (Table S1) [11]. In this study, we use the term ‘non-academic center’ when referring to central hospitals. In Finnish central hospitals, there are own units for large medical specialties (e.g. internal medicine, respiratory medicine, surgery, ophthalmology, oto-rhino-laryngology, dermatology, etc.) and these units are led by specialist physicians.

A typical feature of the Finnish healthcare system, especially in Northern and Eastern Finland, are the long distances between primary and specialized care, and between central and university hospitals. The majority of the Finnish ILD patients are diagnosed and treated by respiratory physicians in specialized care in either university or central hospitals. There are no specific ILD centers in Finland, although the academic centers located in the five university hospitals provide tertiary services in the form of ILD MDMs to other hospitals in their catchment areas. In addition to serving as academic centers, university hospitals also perform the tasks of a central hospital for the residents of the municipalities located in their immediate vicinity. The only lung transplantation center is located in Helsinki University Hospital.

Health care organizations in Finland are widely digitized, as shown in a previous study [12]. Less is known about the implementation of eHealth technologies regarding hospitals’ MDM activities. Our aim was to investigate nationwide practices related to ILD MDMs in the five Finnish university hospital districts including all hospitals, and to reveal how virtual communication has been utilized in the context of ILD MDMs.

## Material and methods

We conducted an electronic survey (Webropol version 3.0) involving 33 questions regarding the implementation of ILD MDMs and another questionnaire with five additional questions that arose after the implementation of the original survey. The questionnaire was planned in cooperation with eight representatives from the five academic respiratory centers of Finland, namely Helsinki University Hospital (HUH) (M.H., U.H.), Tampere University Hospital (TAUH) (H.H.), Turku University Hospital (TUH) (M.K.), Kuopio University Hospital (KUH) (H.N., M.P.) and Oulu University Hospital (OUH) (J.S., R.K). From each university hospital, 1–2 specialists with ILD expertise

were selected to fill out the survey. The questionnaire included both categorical and open-ended questions about the implementation of ILD MDMs, with focus on the utilization of virtual communication. The original questionnaire was in Finnish, but an English translation of the questionnaire is attached in the supplement. Due to the small number of respondents, statistical methods were not utilized in the study and the survey was carried out without blinding. The categorical data was reported as absolute numbers.

## Ethical issues

All participants agreed to participate in the study and publication of the results. No patient data was included in the study. Therefore, according to the Finnish and European Union legislation, the study could be implemented without ethical permissions.

## Results

### Implementation of ILD MDMs in Finnish specialized care

The complete response to the survey was received from all five academic respiratory centers of Finland in February 2022. The essential features of Finnish MDMs are presented in Table 1. In addition, more detailed information on Finnish MDMs according to hospital district in parallel with data on regional prevalence of IPF and anti-fibrotic drug users are presented in Table S2. Four out of five university hospitals have organized separate ILD MDM meetings for about 5–20 years. One center did not organize separate ILD MDMs, but ILDs had been discussed in a weekly multidisciplinary forum in parallel with other respiratory diseases, and it also arranged monthly MDMs where rheumatologists and respiratory physicians discussed connective tissue disease-associated ILDs (CDT-ILD) and vasculitis. In addition to ILD MDMs of the university hospitals, MDMs covering ILDs and other respiratory diseases were arranged in non-academic centers in the HUH and TUH areas without the contribution of the academic centers.

### Use of virtual communication in ILD MDMs

All university hospitals provided an opportunity to participate virtually in MDMs (Figure 1). Access to ILD MDM through virtual communication had been available in OUH and KUH for more than five years, and in HUH since 2010. In TUH, virtual participation in ILD MDM had been possible since 2020, and in TAUH, since 2022. In OUH and KUH, more than

**Table 1.** Essential features of interstitial lung disease multidisciplinary meetings (MDM) in Finnish five university hospitals and their districts.

Parameter	Number of answers (total n = 5)
Frequency of ILD MDMs in university hospitals	
Once a week	1 <sup>a</sup>
Every second week	3
Once in month	1 <sup>b</sup>
Duration of ILD MDMs	
30 – 60 minutes	4
60 – 90 minutes	1
Of all the ILD cases in the university hospital, the percentage of cases discussed in ILD MDM	
More than 50%	2
About 50%	1
Less than 50%	2
The average number of cases per ILD MDM	
8	1
5	2
4	1 <sup>b</sup>
3	1 <sup>a</sup>
The average number of cases in ILD MDM per year	
>150	1
100 – 150	2
50 – 100	1
<50	1 <sup>b</sup>
The proportion of cases from non-academic center in ILD MDM of a university hospital	
30 – 40%	2 <sup>c</sup>
5 – 10%	3
The application used for virtual participation of MDM	
Microsoft Teams	4
Skype	1

<sup>a</sup>This center did not arrange specific ILD MDMs and the frequency of MDMs for all types of respiratory diseases was recorded here. The number of ILD cases per MDM is smaller than in other units because of higher frequency of MDMs. This hospital also organized common meetings for rheumatologists and respiratory physicians once a month, where patients with CTD-ILDs and vasculitis were discussed. <sup>b</sup>This unit also arranged separate weekly ILD meetings for respiratory physicians, where the number of ILD cases per meeting was higher than in ILD MDMs. <sup>c</sup>In these academic centers, virtual access to ILD MDM was utilized by all non-academic centers located in their catchment areas.

Abbreviations: ILD, interstitial lung disease; MDM, multidisciplinary meeting.

a third of the cases handled in ILD MDMs were from non-academic centers and presented through virtual communication. In other academic centers, the proportion of cases from non-academic centers was 5 – 10%. In HUH, TAUH and TUH, those non-academic centers that were not able to attend MDM virtually could refer their ILD patients to MDM when a written consultation response was prepared to a referring unit by a respiratory physician of the academic center.

### Participants and issues discussed in ILD MDMs

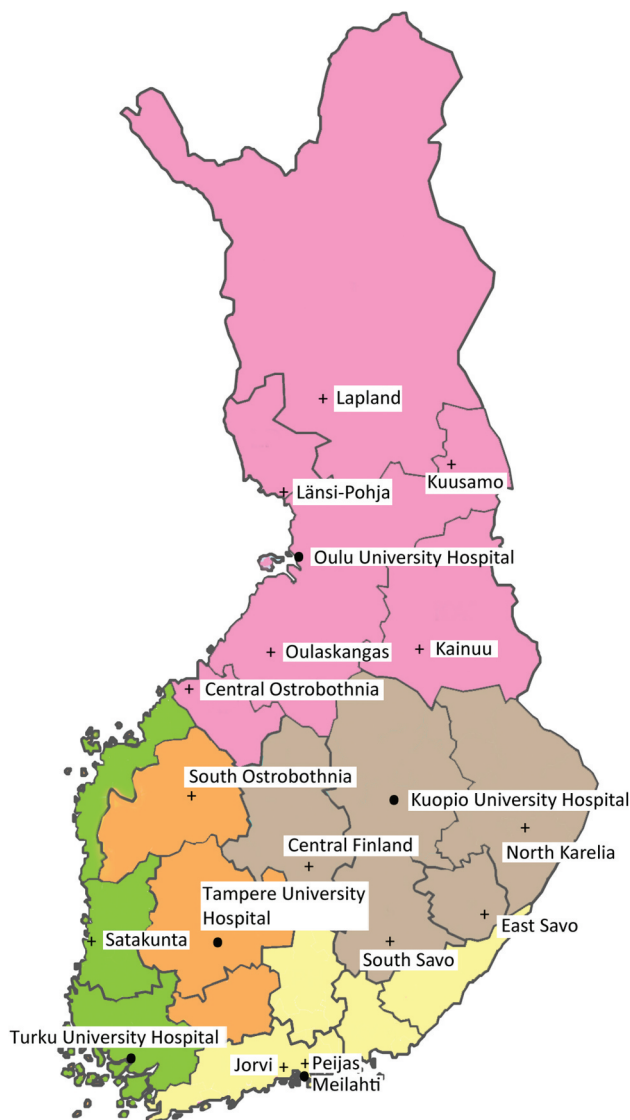
The chair of the meeting was a respiratory physician or radiologist (Table 2). The core multidisciplinary team included 7 – 17 respiratory physicians, 1 – 2 radiologists and 2 – 10 junior staff members (specializing physicians). HRCT images, spirometry, diffusion capacity for carboxyhemoglobin, and autoimmune serology were always examined and available before the case was presented in MDM (Table 3). All centers discussed diagnostic methods, differential diagnostics and diagnostic confidence in ILD MDMs. In two centers, MDM was recommended before the initiation of antifibrotic drug treatment. Other key issues discussed in ILD MDMs are presented in Table 4.

### Patient informing

In all centers, the physician directly responsible for the patient's care (either specializing physician or specialist physician) was the person who presented the case, recorded the decisions made in MDM in the medical records, and contacted the patient. The presenter was in most cases a respiratory physician, and occasionally a rheumatologist. In those regions where virtual access to ILD MDM was available for non-academic centers, the cases were presented via virtual connection by the physician working in that particular center where the patient was from. If the physician directly responsible for patient care was not present in MDM, another physician recorded the decisions. However, also in such cases, the patient was usually informed afterwards by the physician directly responsible for his/her care.

### Items to be improved related to the implementation of ILD MDMs

The respondents of the survey recognized several issues to be improved concerning ILD MDMs. A systematic, concise way to present the cases and a checklist to



**Figure 1.** The five Finnish university hospitals and the respiratory units of their catchment areas that have participated virtually in interstitial lung disease multidisciplinary meetings (ILD MDM). Oulu University Hospital District (pink): Oulu University Hospital, Oulaskangas, Länsi-Pohja, Kuusamo, Lapland, Kainuu, and Central Ostrobothnia. Kuopio University Hospital District (brown): Kuopio University Hospital, North Karelia, Central Finland, South Savo, and East Savo. Tampere University Hospital District (orange): Tampere University Hospital and South Ostrobothnia. Turku University Hospital District (green): Turku University Hospital and Satakunta. Helsinki University Hospital District (yellow): Meilahti, Jorvi and Peijas.

direct the selection of necessary diagnostic studies before ILD MDM were suggested. The need to improve expertise on ILDs and integrate ILD MDMs as part of education were mentioned. A structured referral to ILD MDMs was proposed, as well as a need for more secure virtual connections. The limited number of

respiratory physicians, the need to increase the contributions of central hospital physicians in presenting their own ILD cases and increasing numbers of CTD-ILD patients requiring ILD MDM discussions were also mentioned.

## Discussion

We have presented the national report on ILD MDM practices in Finnish specialized care. To the best of our knowledge, previous reports on nationwide levels have rarely been published. The results showed that each of the five Finnish academic centers organized and coordinated formal MDMs regularly and allowed non-academic centers to send their ILD cases to be discussed in MDM. For several years before the era of Covid-19, virtual attendance in ILD MDMs has been widely utilized especially in Eastern and Northern Finland.

In most Finnish academic centers, more than 50% of all ILD cases were discussed in MDM. Although not all ILD cases were presented in ILD MDM, the opportunity to consult ILD MDM was available in every center in Finland. According to a multicenter study including 457 centers from 64 countries, 76.6% centers held formal ILD MDMs, the proportion being highest in Europe (85.5%) and lowest in Middle East (41.7%) [13]. To the best of our knowledge, representative nationwide reports on MDM practices have not been published apart from this study and an Australian study by Tikellis et al (2021) [14]. In Australia, 97% of public hospitals held MDMs for diagnosing IPF [14].

Due to the low population density and the organization of specialized care, there are several small centers diagnosing and treating ILD patients in Finland, especially in the eastern and northern parts of the country. The situation is comparable with Australia, where the lack of ILD expertise especially in some small regional centers has been a problem [14]. Virtual access to ILD MDMs at tertiary metropolitan centers had supported small centers of Australia, although authors did not declare how widely the virtual communication was used [14]. Richeldi et al reported that MDMs were held solely face to face in 80% of 457 centers worldwide [13]. It seems that the utilization of virtual communication in the context of ILD MDMs has been more uncommon in other countries than in Finland, although the COVID-19 pandemic may have changed the practices after the publication of the international query in 2019 [13].

In Northern and Eastern Finland, the virtual access to ILD MDMs was utilized by all non-academic centers

**Table 2.** Participants of interstitial lung disease multi-disciplinary meetings in Finnish academic centers.

Parameter	Number of answers (total $n = 5$ )
Chairperson of ILD MDM	
Respiratory physician	3
Radiologist	2
Participants of MDM	
Always present	
Respiratory physician	5
Radiologist with ILD expertise	5
Rheumatologist	2 <sup>a</sup>
Junior staff	5
Present in $\geq 50\%$ of MDM	
Rheumatologist	3
Pathologist with ILD expertise	1
Pathologist without ILD expertise	1
Present if invited	
Pathologist with ILD expertise	3

<sup>a</sup>The other academic center mentioned here organised special meetings for rheumatologists and respiratory physicians once a month.

Abbreviations: ILD, interstitial lung disease; MDM, multidisciplinary meeting.

**Table 3.** Requisite clinical data and investigations presented in multidisciplinary meeting (MDM) in Finnish university hospitals.

Parameter	Number of answers (total $n = 5$ )
Information usually available before the patient is presented in ILD MDM	
Chest x-ray	4
High-resolution computed tomography of thorax	5
Spirometry	5
Diffusion capacity for carbon monoxide	5
Bronchoalveolar lavage cell differential count	3
Autoimmune serology	5
6-minute walking test	2
Transbronchial biopsy	0
Transbronchial lung cryobiopsy	1
Surgical lung biopsy	2
Echocardiography	2
Genetic examinations	0
Investigations of exposure agents	4
Investigations presented orally only in MDM (always/always, if available/only, if necessary/never)	
Clinical information	5/0/0/0
Spirometry	5/0/0/0
Diffusion capacity for carbon monoxide	5/0/0/0
6-minute walking test	1/3/0/0
Bronchoalveolar lavage	0/5/0/0
Histopathological findings	0/5/0/0
Investigations viewed as images in MDM (always/always, if available/only, if necessary/never)	
High-resolution computed tomography	5/0/0/0
Histological samples	0/4/1/0
Bronchoalveolar lavage cell differential count	0/2/1/2

Abbreviations: ILD, interstitial lung disease; MDM, multidisciplinary meeting.

**Table 4.** Key issues discussed in multidisciplinary meetings in five university hospitals of Finland.

Issues discussed in ILD MDM	Number of answers (total $n = 5$ )
A consensus approach to diagnosis formulation	5
Final consensus diagnosis and the degree of diagnostic confidence	5
Differential diagnoses	5
The summary of completed diagnostic procedures	4
Medical treatment planning	5
Rehabilitation planning	1
The patient's eligibility to lung transplantation	3
Palliative treatment planning	2

Abbreviations: ILD, interstitial lung disease; MDM, multidisciplinary meeting.

located in the catchment areas of KUH and OUH. In these centers, 30–40% of cases presented in ILD MDM were from non-academic centers. In HUH, TUH and TAUH, this proportion was lower, namely 5–10%. The possibility to participate in ILD MDM virtually might have encouraged the non-academic centers of KUH and OUH areas to send their cases to ILD MDM, which might partially explain the differences mentioned above.

In Finland, the prevalence of IPF differs from region to region, being about 60 per 100,000 in OUH district and 29–35 per 100,000 in other districts [15]. Most ILD patients in Finland are identified first time in primary care and referred to specialized care for further diagnostic studies [16]. The patients assessed in ILD MDMs are those who have already been evaluated in specialized care. Thus, it is not probable that differing ILD MDM practices could fully explain the regional variability in prevalence of IPF in Finland.

In addition to diagnosis forming, ILD MDM has also been commonly utilized in planning of treatment strategies, e.g. drug management decisions [6,13]. According to a report by Teoh et al. investigating the opinions of 117 ILD experts, treatment and management recommendations were regarded as highly desirable items in ILD MDM [9]. In 31.7% of international centers, the permission of an MDM was required for access to antifibrotic drug therapy [13]. Also in Finland, one purpose of ILD MDM was to provide assistance in the medical treatment planning of ILD patients. The reimbursement criteria for the antifibrotic drugs pirfenidone and nintedanib of the Social Insurance Institution of Finland (Kela) do not require the confirmation of diagnosis by MDM or consultation of MDM before the initiation of antifibrotic drug treatment [17]. In two out of five Finnish academic centers (KUH and OUH), however, consultation of MDM was recommended before the initiation of antifibrotic treatment. Interestingly, in these two districts, the prevalence of antifibrotic drug use was highest and the virtual communication was more often utilized than in other districts. It can be speculated that the common virtual participation of non-academic centers in ILD MDMs has increased the expertise of ILDs in OUH and KUH areas, and thus caused more active efforts to recognize IPF patients and offer antifibrotic treatment to them.

Non-academic centers located in Western, Central and Southern Finland have larger population bases and are fewer in number than those in Northern or Eastern Finland, which enables the centers to gather more expertise on ILDs compared with the smaller centers in Northern and Eastern Finland. According to our

knowledge, non-academic centers located in Western and Southern Finland organize their own MDMs, which might partly explain the small number of patients referred to ILD MDM of academic centers from these areas. In a previous study, a travel distance of 70 km or more from home to clinic has been associated with a higher risk of death or lung transplant in Canada [18]. One may assume that the use of eHealth technologies might support pulmonary physicians in small centers with their diagnostic challenges and treatment decisions regarding ILDs, which would increase the equal treatment of patients, improve the quality of care, and provide further education for physicians treating ILD patients at different stages of the career.

According to the previous reports, the core participants of ILD MDM should include a respiratory physician, radiologist, and pathologist [7–9]. In Finnish ILD MDMs, the participants always included several respiratory physicians, at least one radiologist, and members of junior staff. According to Richeldi et al, 57.7% of international centers reported participants from at least four different disciplines in the ILD MDMs [13]. In Finland, four disciplines were not represented in every ILD MDM, but a rheumatologist and pathologist, in addition to radiologists and respiratory physicians, were available in every academic center when needed. According to our results, histopathological data was not available from the majority of patients discussed in MDM, which diminishes the possible contributions of a pathologist in MDM. According to the latest ATS/ERS guideline concerning idiopathic pulmonary fibrosis (IPF) and progressive pulmonary fibrosis (PPF), IPF can be diagnosed without transbronchial lung cryobiopsy (TLCB) or surgical lung biopsy (SLB) if MDM agrees on typical radiology (usual interstitial pneumonia (UIP) or probable UIP) and clinical features for IPF [3]. It has been reported that the majority, namely 78%, of IPF diagnoses in Finland were made without SLB or TLCB [19]. TLCB has decreased the risk for mortality and acute exacerbations of ILDs compared with SLB, which might increase the proportion of patients with histopathological information and strengthen the role of lung pathologists in future MDMs [7].

In Finland, the challenges related to the implementation of ILD MDMs were similar to those in a previous Australian multicenter study [14]. In both studies, lack of ILD expertise, time resources and professionals participating in ILD patients' care were identified. However, as a special feature of Finnish ILD MDM, respondents did not recognize problems in technology or infrastructure related to ILD MDMs, unlike in Australia, for example, although concerns about data security were raised [14]. This is probably due to the uniform public healthcare

system in Finland and good availability of modern health technology and Internet connections regardless of the geographical location of the hospital [12].

This study was limited to ILD MDMs organized in five Finnish academic centers. Informal multidisciplinary discussions were not investigated, nor were the structure and implementation of MDMs in non-academic centers.

To conclude, ILD MDMs are utilized in diagnostics and treatment of ILDs in all Finnish university hospital districts covering all of Finland. Finnish ILD MDMs were implemented according to international standards. Non-academic centers could attend ILD MDMs of academic centers virtually in most parts of Finland, which allowed them to benefit from the ILD expertise of academic centers.

### Acknowledgments

We would like to express our appreciation and gratitude by dedicating this article to our co-author and dear colleague Dr. Ulla Hodgson, who passed away on 4<sup>th</sup> October 2022. She made a significant contribution to the study and understanding of interstitial lung disease.

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