

Work Package One (WP-1): Developing a digital healthcare global network

Launched in March 2023, the ERS CRC CONNECT aims to promote sustainable, equitable implementation of connected digital healthcare in clinical respiratory practice within European and global healthcare systems.

As part of Work Package One (WP-1), we are fostering a global network of members interested in implementing digital healthcare and willing to contribute to proposed projects. By November 2024, the network included 982 people from 83 countries.

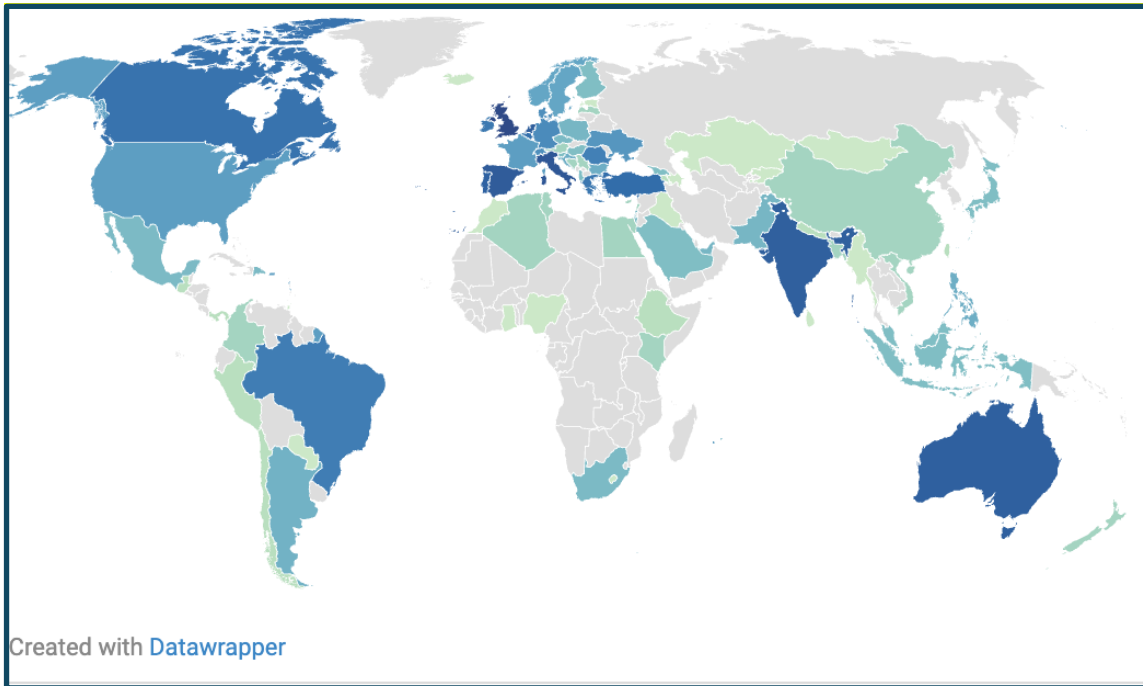


Figure 1: Global network of 982 CONNECT members from 83 countries.

We meet in person at the annual Congress, and use video calls and newsletters to keep colleagues up to date on progress and new opportunities throughout the year. The core projects are described below.



We welcome more members, from clinical medicine, academia, and industry. The link to a registration survey is [here](#). People living with respiratory disease are also welcome to sign up; the European Lung Foundation is a partner, and patient colleagues are also welcome to join a Patient Advisory Group via this [link](#).

Work package Two (WP-II): Repository of digital respiratory technologies

Project Leads: Isaac Cano FRCB-IDIBAPS (Barcelona)

Project team: Shane Fitch, Rick Guar, Tiago Jacinto, Vishakha Kapadia, Elena Khurtsidze, Shailesh Kolekar, Oleksandr Mazulov, Dimitrios Megaritis, Annie Navarro, Sinead O'Connor, Luis Puente, Shirley Quach, Tjeu Souren, Katherina Bernadette Sreter, Tamara Vagg.

Background: Digital respiratory technologies offer patients tailored, seamless self-management support. This can include remote access to clinical advice; monitoring and tailoring clinical care; providing healthcare systems with data to target resources, and monitor/intervening in health events.

Aim: To create a searchable, open-access, user-controlled, European-wide repository of digital respiratory health technologies, thereby enabling efficient knowledge exchange about available digital respiratory technologies.

Methods: The first objective is to determine if the current fields in the [European DHU Radar](#) repository fit the aim of this work package. The second objective is to develop agreed criteria for listing digital respiratory technologies within the [European DHU Radar](#) repository. Finally, a dedicated ERS CRC CONNECT landing page will be created within the [European DHU Radar](#) repository with an open peer-review process to facilitate listing.

Impact: This unique platform will enable the discovery of digital respiratory innovations in Europe, promote their adoption and success, and connect with owners of digital health innovations.

Core deliverables:

- Dedicated ERS CRC CONNECT landing page within the European DHU Radar repository
- ERS CRC CONNECT peer review criteria
- Processes for listing digital respiratory technologies.

Work Package Three (WP-III): Systematic scoping review of implementation research in digital respiratory healthcare

Project Leads: Amy Hai Yan Chan (Auckland), Hilary Pinnock & Io Chi Yan Hui (Edinburgh)

Project team: Ayşe Önal Aral, Matthew Armstrong, Izolde Bouloukaki, Malek Chaabouni, Kathleen Condon, Carlos Figueiredo, Aleksandra Gawlik-Lipinski, Apolline Gonsard, Georgios Kaltsakas, Dario Kohlbrenner, Shailesh Kolekar, Kate Loveys, Zoe McKeough, Milan Mohammad, Cátia Paixão, Efthymia Papadopoulou, Shirley Quach, Adrian Paul Rabe, Tonje Reier-Nilsen, Nicola Roberts, Paul Robinson, Hani Salim, Sami O. Simons, Katherina Bernadette Sreter, Patrick Stafler, Anthony Paulo Sunjaya, Anna Vanoverschelde.

Protocol: Hui CY, et al. *Implementing digital respiratory technologies for people with respiratory conditions: a protocol for a scoping review.* *PLOS One* (in press)

Background: Chronic respiratory diseases affect over 545 million people globally, negatively impacting individuals' quality of life and placing a significant burden on healthcare systems. Digital technologies provide an opportunity to improve care; however integrating digital health technologies into routine care is complex and challenging, with relatively few interventions moving from research into practice.

Aim: Systematic scoping review of existing research on implementing digital respiratory interventions. Our findings will support broader goals within the ERS CONNECT CRC, encourage collaboration among patients, clinicians, researchers, and technologists, and facilitate a unified framework for digital health in routine care across the EU and potentially worldwide.

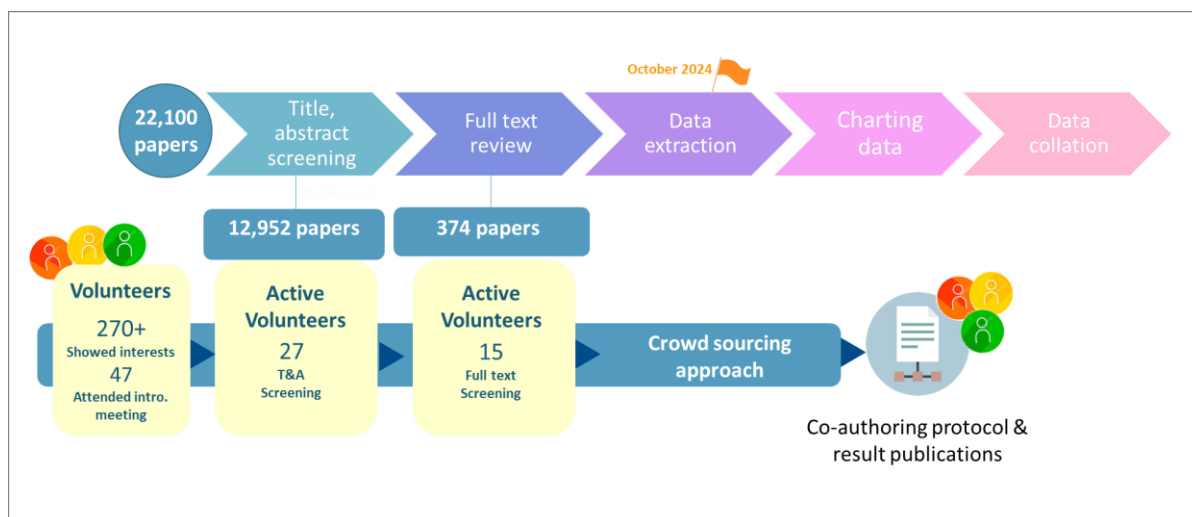


Figure 2: WP-III progress (October 2024)

We are following the **five steps** outlined by **Arksey and O'Malley** in their methodological framework for designing a scoping review, to ensure an explicit approach to conducting the review and allow for the identification of all relevant literature, thus producing in-depth and broad results. Following discussion at the CONNECT CRC meeting at the 2023 ERS

Congress, we refined the review questions with input from multidisciplinary volunteers from the CONNECT network.

The **review questions** will examine:

1. What respiratory digital health has been implemented in routine clinical practice in the last 10 years?
2. What frameworks were used to develop and evaluate the implementation strategies?
3. What population level outcomes were used in the evaluation?
4. What strategies were used, and which barriers and enablers to implementation were identified?
5. What insights were described relevant to the CONNECT overarching themes of reducing inequity, enhancing patient/professional relationships, supporting the patient journey, and reducing adverse environmental impact?

Impact: Findings from this scoping review will guide standardized approaches to developing, evaluating and reporting the implementation of digital respiratory healthcare, with the ultimate aim of harmonizing care at the patient, professional and systems level.

Core deliverables:

- Journal publication of the scoping review protocol and scoping review findings
- Position paper on frameworks and reporting standards for digital respiratory implementation studies

Work Package Four A (WP-IVa): Position papers on barriers and facilitators to the implementation of digital health in respiratory care across Europe

Project Leads: Ireti Adejumo (Nottingham), Hilary Pinnock (Edinburgh).

Project team: Paula Almeida, Sameera Ansari, Jeanne Mifsud Bonnici, Amy Chan, Delian Hofman, Oleksandr Mazulov, Esther Metting, Tricia McKeever, Cátia Paixão, Holly Tibble.

Background: Digital health technologies are being used to transform care, however both research and implementation in long-term respiratory conditions have been patchy. These technologies, however, hold significant promise in enabling provision of high-quality, personalised care despite resource constraints, and increasing system efficiency and productivity.

Aims: To scope the European digital health landscape for factors which may facilitate or impede the effective, equitable and coherent uptake of digital health in respiratory care. This will result in a position paper (or papers) to highlight unmet needs and inform future research and implementation.

Progress: Projects relating to the following two questions have been launched:

1. What policy and regulatory factors impact on the uptake of digital health in respiratory care across Europe?

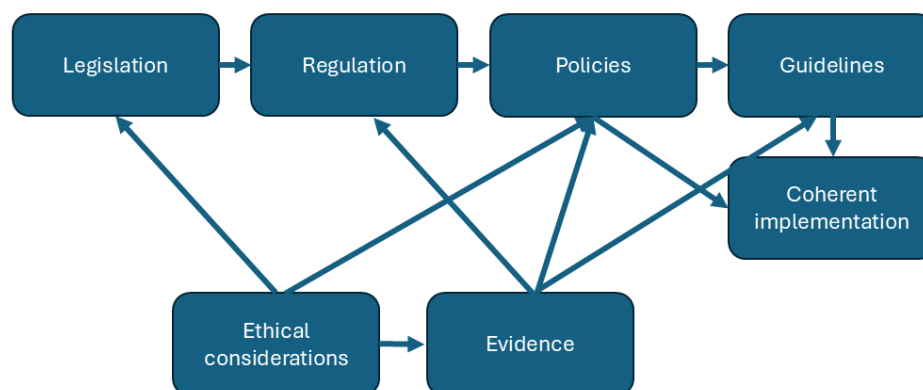


Figure 3: Interrelationships between guidelines, policies and regulations

2. What are the patient factors experienced by underserved communities across Europe which may impact on the implementation of equitable digital health in respiratory care?

These projects are being addressed using scoping and systematic review methodology which will be followed by stakeholder engagement to provide context and relevance to findings. Both are in protocol development stage, with initial searches anticipated to begin before the end of 2024 and stakeholder work to commence in 2025.

Impact: The identified barriers and facilitators will highlight unmet needs and inform design of future implementation research, as well as provide patients, their clinicians, payers and industry with insights to inform real-world implementation.

Core deliverables:

- Position papers on barriers and facilitators to the implementation of digital health in respiratory medicine across Europe
- Value framework for assessing the impact of policy and regulation on digital respiratory care

Work package Four B (WP-IVb): Core digital respiratory outcomes for clinical trials

Project Leads: Job F.M. van Boven (Groningen), Richard W. Costello (Dublin), Amy H. Y. Chan (Auckland)

Project team: Guy G. Brusselle, Christopher E. Brightling, Kjeld Hansen, Bruce J. Kirenga, Jerry A. Krishnan, Hilary Pinnock, Nicolas Roche, Kit C.B. Roes, Salman Siddiqui.

Background: Clinical trials are our core instrument to evaluate the effectiveness of (novel) respiratory interventions. Randomised trials are the gold standard to evaluate treatment efficacy, but can be limited by population inclusion criteria (hampering patient representativeness), an artificial controlled setting (hampering generalisability of behaviour), and a restricted number of data collection points (preventing the understanding of the course of disease in between visits). It may be possible to reduce the economic and environmental impact of trials by re-thinking their design and conduct. Digital technologies can form part of this solution, by enabling trials to include a wider population, be performed (partly) at home (so called “decentralised trials”), and collect more granular data (helping us to better understand the working mechanism and variability in response) while lowering the cost and footprint of clinical trials. Presently, there is a lack of structured guidance for the respiratory community on the opportunities and use of digital technologies in clinical trials.

Aim: To provide guidance for the use of digital technologies in clinical trials in the respiratory area. These may include all ERS focus areas such as asthma, COPD, ILD, TB, lung cancer and CF.

Methods: We have published a [position paper](#) on the potential value of digital technologies in clinical trials, using asthma as an example. We described opportunities and challenges from different perspectives (e.g., clinical, regulatory, patient, economic, sustainability, LMIC) and outlined a roadmap for future research needs. The next key step will be the development of core sets of digital (bio)markers and outcomes for different respiratory diseases.

Impacts: The core sets of digital (bio)markers and outcomes will facilitate standardized approaches to developing, conducting, evaluating and reporting clinical trials using digital respiratory technologies, making them more generalizable, (cost)efficient, sustainable and more suitable for meta-analysis of their findings.

Core deliverables:

- Position paper on the potential of digital technologies to augment clinical trials, taking asthma as a case example (Van Boven JF et al. Augmenting clinical trials in asthma through digital technology, decentralised designs and person-centric endpoints: opportunities and challenges. *Lancet Respir Med* 2024)
- Core sets of digital (bio)markers and outcomes for different respiratory diseases to be used in clinical trials

Work Package Five (WP-V): Collaborative projects

Collaboration is central to achieving our aims, and we have been working with colleagues as diverse as large EU consortia, clinical colleagues, and PhD students. Here are some examples of our collaborations.

- **DRAGON/CONNECT project.** Led by Michaela Senek, David Drummond and Pippa Powell, members of the CONNECT network joined forces with ELF patient colleagues from the IHI COVID-19 [DRAGON](#) project to explore the impact of technology on the patient/professional relationship. This had emerged as an important question after the need for remote consulting during the pandemic. The paper is under review with a journal, but in the meantime here is the [abstract](#) that was presented at the Congress in Vienna.
- **The Chat-GPT project 'AIR-CAD'.** Many thanks to everyone who helped Mattia Nigro, a PhD student from Milan, by suggesting questions on COPD, asthma, bronchiectasis and chronic cough for him to pose to Chat-GPT. He is now working on publications.
- **SPEAKtoCOPD.** On World COPD Day 2024, we helped advertise Sami Simons and Loes van Bommel's [Speak to COPD](#) project. The team from Maastricht are collecting as many voices as possible from around the world in order to build an AI algorithm that predicts exacerbations of COPD using changes in voice.