Update from DIGICORE on development of a digital outcomes research network design

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DIGICORE aims to help its European members prepare for the digital revolution that will transform research through the routine use of electronic health records and molecular diagnostic information for trial automation, outcomes research, digital diagnostics, and care quality management. The development of the DIGICORE alliance begun with OECI institutions and representatives 4 years ago and after almost 2 years incubation time came into legal being in April 2021. Like the Organisation of European Cancer Institutes (OECI), DIGICORE is set-up as a European Economic Interest Grouping (EEIG). The current DIGICORE network includes 36 hospitals and 2 cancer networks (UNICANCER and Alleanza Contro Il Cancro) in 16 European countries and welcomes additional institutions to join the network. The two commercial partners are IQVIA, the leading contract research organisation, and Illumina, the global leader in DNA sequencing and bioinformatics.

The intended benefits of DIGICORE participation for researchers is to share experiences, set standards in data harmonisation, and share best practices in privacy conserving research approaches without data pooling. For cancer centres the benefit will be a network of centres to increase the sample of patient data to improve translational research. Most importantly, for patients DIGICORE hopes to improve clinical outcomes through more efficient real world evidence studies including care quality monitoring.

DIGICORE update: Progress in creating digital interoperability in cancer across Europe

One of the critical objectives for DIGICORE is to establish a basis for European digital interoperability in hospital oncology electronic health records. By defining a scalable common international minimum dataset for cancer, and piloting technology to extract this data more efficiently than traditional manual approaches, this has the potential to transform the management of cancer care and reduce the cost of precision oncology research. To address this objective, in 2022 DIGICORE opened an application process to develop a federated, interoperable, pan-European network and the resulting pilot is called the DIGItal Oncology Network for Europe (DigiONE).

DIGICORE invited care quality-focused hospitals from its own membership and those from the OECI to apply for funding in a two-step process. Step 1 included the development of clinical consensus on a European minimum data standard to describe cancer. 16 cancer centres in 13 European countries participated in the clinical consensus to define the minimum data standard. DIGICORE set Minimal Essential Description of Cancer (MEDOC) as the target specification for an open innovation challenge for the participating hospitals.

Step 2 asked hospitals to design a local implementation of that consensus in near-real-time routine data. Hospitals designed and costed a local working prototype for one of many nodes in a federated network with appropriate privacy management under the general data protection regulation (GDPR). In keeping with DIGICORE's open innovation approach, they could use any IT solution of their choice, be it open source or commercial. Training will be provided on modern technology options such as optical character recognition (OCR) and natural language processing (NLP) to help hospitals integrate state-of-the-art technologies. Combined with improvements in primary data capture, these solutions promise to deliver high-quality, complete data essential for modern research and care quality monitoring.

Entries were judged by an independent expert committee, including patient representation, in October 2022. The hospitals selected to take part in the DigiONE pilot and awarded funding are:

- **Frankfurt University Hospital** in Germany, led by Prof Dr Christian Brandts, Prof Dr Janne Vehreschild, and Prof. Holger Storf
- **Leeds Teaching Hospitals** NHS Trust in England, led by Prof Geoff Hall
- **Maastricht Comprehensive Cancer Centre** in the Netherlands, led by Prof Andre Dekker and Dr Alberto Traverso
- **Oslo University Hospital** in Norway, led by Prof Åslaug Helland and Sissel Jor
- **Cliniques Universitaires Saint-Luc** in Belgium, led by Prof Cedric Van Marcke
- **Ospedale San Raffaele University and Research Hospital** in Italy, led by Prof Giovanni Tonon

Following a few months of required contracting, work on the DigiONE initiative began in March 2023 with the first meeting of representatives from all 6 selected hospitals (plus collaborators from 4 other hospitals). The DigiONE pilot is expected to be complete end Q1 2024 with dissemination of research outputs.

The first DigiONE meeting in Frankfurt

The first meeting, including participants from all 6 DigiONE hospitals, took place in Frankfurt in March 2023. The meeting had 3 key objectives: 1) to catalyse a European digital care quality improvement community, 2) to co-develop a portfolio of exciting research concepts, and 3) to start the detailed data normalisation planning.

Objective 1: Catalyse a European digital care quality improvement community

There were 55 attendees in total including representatives from 10 hospitals. These 10 hospitals include the 6 DigiONE hospitals listed above plus the Regina Elena National Cancer Institute in Italy, Tartu University Hospital in Estonia, Tays/Tampere University Hospital in Finland, and Trinity St James Cancer Institute in Ireland. The meeting was attended by individuals belonging to various disciplines, including those with clinical, scientific, IT, and project management roles. This is rather unusual and a strength of DigiONE to have IT, data managers, and clinicians in the same meetings working together towards a scientific research interest.

DigiONE and IDEAL4RWE meeting - Frankfurt, March 2023

Objective 2: Co-develop a portfolio of exciting research concepts

The goal of the DigiONE network is to fill evidence gaps in multimodal cancer care with transformative real-world evidence. It is up to the research teams at the 6 hospitals to decide which research questions they want to address in the next 12 months. To develop a list of research ideas, there were sessions on subjects such as 'comparative health systems research', 'research opportunities using routine blood data', 'impact of Covid-19 on cancer care', 'predictive biomarkers', and 'comparative effectiveness'.

Members of the network presented real-world data studies they had been a part of, including the rationale for key design considerations and complexities with data normalisation. This included the Ovarian Real World International Consortium's (**ORWIC**) study[1] discussed by Prof Geoff Hall from Leeds Teaching Hospital which is an example of the type of natural history study that DigiONE may conduct in other indications. The attendees also heard from four research teams that have ongoing studies as part of the IDEAL4RWE Leadership Training Programme, which is an initiative within DIGICORE to provide training and funding for researchers <45 years old to build the skills necessary to lead multi-site real-world data studies.

Out of the sessions there was a long list of research ideas ranging from simple studies with few data items which can be conducted pan-cancer to test our data quality to more complicated studies which require extensive information per patient on narrower cohorts such as natural history and comparative effectiveness studies. Such analyses will also provide international benchmarking on care quality. The research ideas will be prioritised by individuals from the 6 DigiONE hospitals to be developed into protocols. IQVIA will provide support by making available the services of a medical writing team to develop protocols, and plan to develop 5 to 10 real-world research protocols in 2023. The protocols the DigiONE network proceed with will be based on feasibility in terms of clinical interest, approval by hospital ethics committees, availability of data, and sufficient number of patients for informative outputs.

Objective 3: Start the detailed data normalisation planning

Retrospective research typically involves a substantial amount of manual retype from medical notes at the hospital to an eCRF, given that many key baseline clinical characterisation data items (such as history of comorbidities and other cancer diagnoses, disease stage at diagnosis, performance status) and outcomes data items (such as response to treatment) are not in a structured format that can be automatically extracted. One of the key objectives of DigiONE is to test the use of NLP with the aim of increasing data completeness and reducing the manual effort for hospital staff conducting research. Given the hospitals do not want to have to wait for multi-site data harmonisation and testing of technology such as NLP to be complete to begin research, there may be studies conducted earlier during the 12-month pilot that can run using manual curation for data not in a structured format.

Sessions such as 'Cancer OMOP Normalisation' were carried out by the Observational Medical Outcomes Partnership (OMOP) team from IQVIA, including discussing how to convert local data into a common data format so that the 'data means the same thing' across the network. The DigiONE network intend to conduct analysis using the privacy conserving federated analysis approach, which allows reporting of outputs from multiple hospitals without pooling patient-level data and only needing to share aggregate outputs outside the hospital.

Network building over beer

The molecular biologist James Watson once said: "At lunch Francis [Crick] winged into the Eagle [pub] to tell everyone within hearing distance that we had found the secret of life [DNA]". Watson and Crick joked that most of their innovation was done at the Eagle pub near their laboratory in Cambridge.

1. Cheeseman S, Levick B, Sopwith W, Fenton H, Nam EJ, Kim D, Lim S, Martin E, Frenel JS, Bocquet F, Kubelac P. Ovarian Real-World International Consortium (ORWIC): A multicentre, real-world analysis of epithelial ovarian cancer treatment and outcomes.

At the DigiONE meeting in Frankfurt, ample time was given in the agenda to catalyse international collaboration outside of formal sessions. On the first night, most attendees sat with colleagues from their hospitals, however by the second night most tables had individuals from three or more hospitals (and it was a lot noisier!). The group enjoyed German beer and a cruise on the river Main with the backdrop of the Frankfurt skyline (known as 'Main-hattan').

DigiONE and IDEAL4RWE meeting - Frankfurt, March 2023

How to get involved with DigiONE research

Clinicians from the 6 DigiONE hospitals will soon be selecting which study ideas to prioritise for this 12-month pilot and IQVIA's medical writing team will be developing protocols which will be ready in June. The DigiONE network welcome additional OECI hospitals to join a research protocol and for those contributors to be authors in the publications, provided they can fund their teams to create the required dataset without support. Piers Mahon, from IQVIA's European Data and Evidence Networks group and Commercial Research Manager for DIGICORE, will be at the OECI meeting in June in Paris and would be delighted to speak to attendees about DIGICORE and DigiONE.