



Research clusters on visit at King's Health Partners in London 2019. Back row: Peter Lommer Kristensen, Stig Mølsted, Søren Barlebo Rasmussen. In front: Jakob Kleif, Morten Bestle, Ellen Løkkegaard, Thea Kølsten Fischer, Lise-Lotte Olsen Pirovano, Malene Starup Stage. Private foto.

RESEARCH CLUSTERS AT NORDSJÆLLANDS HOSPITAL

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Research clusters at Nordsjællands Hospital

Since 2014 clinical research at Nordsjællands Hospital has been organized in research clusters of which 'The Epidemic Cluster' was established as the latest in 2020. The five research clusters are:

- The Perioperative Treatment Cluster
- The Woman Child Adolescent Cluster
- The Epidemic Cluster
- The Diabetes and Vascular Disease Cluster
- The Infection and Inflammation Cluster

The 'Research strategy of Nordsjællands Hospital for health research 2019-2024', focuses on clinical research in the hospital's research clusters. The organization of research in five clusters invites researchers to fruitful collaborations across research areas and specialties - both internally and externally. Special attention is paid to develop collaborations, increase synergies, and sparre within in the five clusters. The hospital's joint research infrastructure contributes to ensuring high-quality research. The overall purpose of the research clusters is to form platforms and structures that bring different scientific competences together and contributes to creating broad collaborations, which benefit the quality of research.

Vision - The overall purpose of the research clusters is to form platforms and structures that bring different scientific competences together and contribute to creating broad collaborations that benefit the quality of research. The clusters are working according to several values:

- Establish and maintain strong and attractive research environments
- Focus on knowledge that benefits the patients
- Create platforms for clinical research close to the patient
- Collaboration between clinic, teaching and research
- Research-based development and change
- Use and visibility of research results
- Establishment of financing strategies
- Improve patient care through interdisciplinary research efforts
- Development and maintenance of research culture
- Create physical research frameworks
- Achieve synergistic effects
- Create effective and creative research
- Professional development of employees

Goal - The aim of the research clusters is to ensure evidence-based, relevant, and patient-centered research at an international level.

The clusters' steering groups ensure the establishment of clear research management, which focuses on an attractive workplace and the conditions that facilitate the retention and recruitment of competent employees. The research clusters contribute to:

- Research-attractive environment with facilitation of knowledge sharing and interdisciplinarity
- Good framework for research with clear research management and structured collaboration
- Taking home larger fund grants
- Research at an international level
- Recruitment and retention of staff

Everyone with an interest in research, experienced or inexperienced, is welcome to contact the individual clusters.

The Perioperative Treatment cluster

Introduction and clinical issues

The vision is to improve the perioperative process with focus on reducing morbidity and mortality for patients undergoing surgery. This is attempted to be achieved through research in clinical everyday life, aiming to a direct improvement of the patients' progress. There is focus on making the patients painless in the perioperative process, identification of risk patients, rapid optimization, and treatment of acute high-risk patients, as well as new developments and further developments of existing surgical methods with a view to improving both the perioperative process, but also the long-term prognosis for the patient. The research focuses on the patients' needs and the results of the research must be able to be implemented quickly in clinical everyday life for the benefit of the patients and the hospital.

Current projects

- **AHA** – Acute High Risk Abdominal surgery course includes rapid diagnostics as well as optimized preoperative and primary postoperative treatment of AHA patients. Since 2019, several research projects have been initiated aiming at investigating post-operative complications in the heart, lungs, and kidneys, identifying risk patients, and reducing post-operative complications and mortality. PhD-project.
- **OPMICS** – Optimizing peripheral nerve blockade for pain relief in patients undergoing laparoscopic surgery for colon cancer. Clinical randomized blinded multicenter study starting from Nordsjællands Hospital in collaboration with hospitals in: Herning, Viborg and Esbjerg. The aim is to compare the effect of several procedures for creating a transversus abdominis plane block contra placebo. PhD-project.
- **CME** – Complete Mesocolic Excision. Based on CME, a regional database for the treatment of colon cancer has been built. Data on 4,500 patients forms the basis for an upcoming dissertation and many master's theses focusing on oncological outcome, the effect of chemotherapy after CME and the connection between the development of abdominal wall hernia and, among other things, incision type and adjuvant chemotherapy.
- **Intraoperative Strategy in Acute Abdominal Surgery** - An intraoperative quality improvement strategy using a standardized multidisciplinary timeout model, which ensures that one of three surgical strategies is used: definitive, palliative or damage control surgery. The effort individualizes the intra- and postoperative treatment efforts for the benefit of the individual patient. Project start in 2021.

Steering committee

- [Anders Bertelsen](#), Chairman, PhD, research associate professor, Department of Surgery.
- [Jakob Kleif](#), Department physician, PhD, clinical associate professor, Department of Surgery.
- [Kai Henrik Wiborg Lange](#), Professor, dr.med., Department of Anesthesiology.
- [Lars Hyldborg Lundstrøm](#), PhD, research associate professor, Department of Anesthesiology.
- [Mai-Britt Tolstrup](#), Senior physician, PhD, clinical associate professor, Department of Surgery.

The Woman Child Adolescent cluster

Introduction and clinical issues

The vision for the cluster is to strengthen effective and creative research in women, children and adolescents development and disease. Through interdisciplinary and interprofessional collaboration and sparring, we seek to make knowledge sharing and methodological resources more accessible to people interested in our cluster research. The cluster primarily consists of researchers from the Department of Gynecology and Obstetrics and the Department of Children and Adolescents. Among others we collaborate with researchers fra Surgical Department (Gastromedical Unit) and the researchers from The Diabetes and Vascular Disease Cluster.

Projects

We are currently collaborating on several research projects across departments. The focus is on the projects being close to the clinic and implementable in everyday clinical life. Three cluster projects in which both Department of Gynecology and Obstetrics, and the Department of Children and Adolescents are involved, are highlighted below.

- **FitMum** is one of the major intervention cluster projects of recent years, which has been carried in collaboration with the University of Copenhagen. The purpose of FitMum is to investigate the best possible way to increase the activity level of pregnant women; through structured team training or motivational talks combined with normal diet and exercise guidance for pregnant women. The results are currently being analyzed and are expected to be published in scientific journals soon. In addition, the project's long-term beneficial health effects for mother and child will be mapped in the FitBaby and FitKids studies, which examine the children at 1 and 3 years of age.
- **CareMum COVID-19** was one of three projects in Denmark which, in the wake of the first COVID-19 wave in the winter and spring of 2020, collected data on infection among pregnant women. With data collection starting in May 2020, the project is a good example of how resources in health research can be mobilized quickly, with the right combination of solid professional skills and bureaucratic goodwill. The project's results showed that in 2 out of 28 Corona patients, Corona virus was present in the vagina, and that 4 out of 28 Corona patients experienced serious maternal and fetal outcomes, including one fetal death.
- **READY-MOM** is a national randomized controlled trial of initiations of births introducing either low-dose misoprostol or double-balloon catheters. The purpose is to investigate how we can create the safest environment during the birth process, and how we can free up time in the birth delivery rooms for the necessary nursing and caring work. The effect of these birth initiation methods is primarily measured by caesarean section rate, but a central part of the study is also to focus on the families' birth experiences, the establishment of breastfeeding and the children's early development. The project is expected to start at the end of 2022.

Steering committee

- [Ellen Løkkegaard](#), chairwoman, coordinating professor, senior physician, PHD, Department of Gynecology and Obstetrics.
- [Bo Mølholm Hansen](#), clinical associate professor, parttime researcher, senior physician, PhD, Department of Children and Adolescents.
- [Inger Merete Jørgensen](#), clinical associate professor, senior physician, PhD, Department of Children and Adolescents [Grete K. Teilmann](#), clinical associate professor, senior physician, PhD, Department of Children and Adolescents .
- [Jane Bendix](#), midwife, cand.scient.san, PHD, parttime researcher, clinical specialist, Department of Gynecology and Obstetrics.

The Epidemic cluster

Introduction and clinical issues

The Epidemic cluster was formed within the first weeks of the COVID-19 pandemic, based on a desire from several of the hospital's senior researchers and professional beacons to bring many health professional skills into play, and in a structured way ensure rapid collection and analysis of COVID-data and thus evidence-based knowledge about the new global health crisis. Knowledge that could benefit patients as soon as possible. In the first joint project, we elucidated risk factors and characteristics of COVID-19 hospitalized patients at Nordsjællands Hospital during the first wave of the epidemic. The form of collaboration for this project and for the subsequent SARS-CoV-2 projects (including seroprevalence among employees and late effects of COVID-19) are based on 'crowd research' principles, where researchers with different backgrounds and experience contribute with different skills in joint projects across disciplines. The researchers from various specialties have shown great readiness to participate in research processes at all levels from start to finish, and the cluster has subsequently developed its own "crowd research" procedures. The cluster has a natural focus on COVID research, but after changing its name from COVID cluster to Epidemic cluster, it has expanded the spectrum to other epidemic infections such as influenza and RSV infections.

Some of the clinical issues the cluster focuses on are:

- COVID-19: conditions of infection, routes of infection, disease course, immunity, complications, and late effects
- Home admissions of epidemic patients

Completed projects

- Characteristics and early outcomes of patients hospitalized for COVID-19 in North Zealand, Denmark. Lendorf ME, Boisen MK, Kristensen PL, Løkkegaard ECL, Krog SM, Brandt L, Brinth LS, Nolsøe RLM, Rysør C, Eiken P, Bestle MH, Jørgensen IM, Pedersen-Bjergaard U, Lindegaard B, Christensen TB, Fischer TK. *Dan Med J.* 2020 Aug 12;67(9):A06200428.
- Seroprevalence and duration of SARS-CoV-2 antibodies in Danish HCP during 39 weeks. Klint Johannesen C, St. Martin G, Lendorf M, Garred P, Fyfe A, Paton R, Thompson C, Molsted S, Kann CE, Jensen CA, Hansen CB, Løkkegaard E, Christensen TB, Simmonds P and Fischer TK. *In review Dan Med J.*
- Risk factors for fatigue and impaired function eight months after hospital admission with COVID-19. Subtitle: A COVID-19 cohort study from Copenhagen University Hospital - North Zealand, Denmark. Brinth L, Mølsted S, Pedersen-Bjerggaard U, Løkkegaard E, Lendorf M, Heglund M, Rysør C, Sommer DH, Nolsøe R, Harboe Z, Browatski A, Brandt L, Bestle M, Jensen TØ, Fischer TK, Krog SM, Lindegaard Madsen B. *Accepted Dan Med J.* 2022

Steering committee

- [Thea Kølsten Fischer](#), chairwoman, professor, Clinical Research Department
- [Birgitte Lindegaard Madsen](#), research associate professor, Department of Pulmonary and Infectious Diseases
- [Louise Brinth](#), senior physician, Department of Imaging and Radiology
- [Ulrik Pedersen-Bjerggaard](#), professor, senior physician, Department of Endocrinology and Nephrology
- [Stig Mølsted](#), associate professor, assistant manager, Clinical Research Department

The Diabetes and Vascular Disease cluster

Introduction and clinical issues

The research cluster 'Diabetes and Vascular Disease' is a framework for collaboration between the medical specialties of endocrinology, nephrology and cardiology. The background for the collaboration is that patients from these specialties often have diseases which are treated in all the specialties, for example diabetes, cardiovascular disease and nephropathy. The research cluster focuses on frequent diseases, i.e., diseases or conditions that affect many people, either in an acute setting or in connection with an outpatient clinic at NOH. The aim of the research cluster is to support research that can create value for the patient and the hospital. In the cluster we focus on type 1 diabetes and hypoglycaemia, exercise, and cardiovascular disease, treatment and monitoring of diabetes during hospitalization, type 1 diabetes etiology, and acute renal failure during hospitalization.

Projects

- HypoResolve: The project, which is carried out in a European consortium, will bring about various aspects of hypoglycaemia. At NOH, in collaboration with Dutch researchers, hypoglycemic clamps are carried out to shed light on how hypoglycemia is associated with an increased risk of cardiovascular disease. NOH's population of type 1- patients participates in the project and Ulrik Pedersen-Bjergaard is the PI.
- HypoTrain: The project, which is a collaboration between diabetes researchers in Aarhus (SDCA) and Sheffield (UK), is about type 1 diabetes and physical activity. The study maps the exercise habits of people with type 1 diabetes and how exercise is "handled" daily. NOH's population of type 1 patients participates in the project. Peter Lommer Kristensen is the PI and Stig Mølsted from the Research Department has also a key role.
- CGM-ISO: In this project, it is investigated whether the use of telemetric continuous blood sugar measurement is associated with better blood sugar control in people with diabetes, who are hospitalized and quarantined (due to infectious disease). The project has also led to secondary studies. Hospitalized patients at NOH contribute to the study and Peter Lommer Kristensen is the PI. Birgitte Lindegaard from the Department of Pulmonary and Infectious Medicine is a collaboration partner.
- Acute kidney failure after acute high-risk abdominal surgery (AHA): The project aims to identify which factors are associated with an increased risk of - in the aftermath of acute abdominal surgery - developing kidney failure. The novelty in this project, will be elucidated via peroperative kidney biopsies. Lisbet Brandi is the PI on the project, which is carried out in collaboration with The Perioperative Treatment Cluster.
- Is the SARS-CoV-2 pandemic (COVID-19) going to affect the risk of type 1 diabetes as well as the type 1 diabetes phenotype: The project aims to investigate whether infection with COVID-19 increases the risk of developing type 1 diabetes (and other selected autoimmune endocrinopathies). PI is Runa Nolsøe. The project is carried out in collaboration with the The Epidemic Cluster.

Steering committee

- [Peter Lommer Kristensen](#), chairman, research associate professor, Department of Endocrinology and Nephrology
- [Charlotte Kragelund](#), senior physician, Department of Cardiology.
- [Ulrik Pedersen-Bjergaard](#), professor, senior physician, Department of Endocrinology and Nephrology
- [Lisbet Brandi](#), leading physician, clinical associate professor, Department of Endocrinology and Nephrology
- [Runa Nolsøe](#), senior physician, Department of Endocrinology and Nephrology

The Infection and Inflammation cluster

Introduction and clinical issues :

Based on patients with infection or inflammation, we will create a platform for clinical, patient-oriented research, where we describe connections and associations, identify possible points of improvement, and carry out intervention studies. We will generate applicable research results of high quality and relevance and seek to implement these in the organization. In the cluster we will work multidimensionally across departments, professional groups and competencies and we will collaborate nationally and internationally.

Infection and inflammation are accompanied by an acute or chronic loss of function, which leads to hospitalization due to failure of the lungs, kidneys, circulation, brain, and muscles. The acute course of infection/inflammation is different depending on the patient's age, co-morbid condition, other dispositions, exposures, and the treatment offered in the primary sector, pre-hospital and during hospitalization. The long-term prognosis is different depending on the patient's age, co-morbid condition, other dispositions, exposures, the treatment offered in the hospital, as well as the aftercare offered after discharge. Despite the differences, we treat most patients with the same doses of antibiotics and the same regimens, regardless of e.g., age, gender, and co-morbidity. Much suggests that we need to move away from "one size fits all" to more individual based treatment. To improve the course of patients with infection and inflammation, it is thus necessary to understand the importance of single factors, the interaction between infection and inflammation, the patient's dispositions, and the system's handling. There are only a few prospective randomized intervention studies which examine whether it is possible to change the patient course.

Projects

- The Biofilm project. Collaboration with Department of Clinical Microbiology på Rigshospitalet and Herlev Hospital. There are more sub-projects:
 - Lactate as biomarker for lower respiratory tract infections and inflammation in intubated patients
 - Microbiological multiplexed Point of Care testing of endotracheal aspirate from intubated patients; a retrospective study
 - The influence of active and passive air humidification on exhaled breath condensate volume
 - Nitric oxide as a biomarker for airway infection in mechanically ventilated patients.
- Audio-vestibular function in patients with neuroborreliosis, bacterial and viral meningitis. PhD project with collaboration between Department of Ear, Nose and Throat and Department of Pulmonary and Infectious Diseases.
- Medical treatment of foreign bodies stuck in the oesophagus. Upcoming collaborative project between Department of Ear, Nose and Throat and the Emergency Department.
- Endothelial damage in acute respiratory failure in the intensive care unit and in patients with community-acquired pneumonia. PhD project (Initiated at Intensive, collaboration with Department of Pulmonary and Infectious Diseases and the Blood Bank at Rigshospitalet.

Steering committee

- [Birgitte Lindegaard Madsen](#), chairwoman, research associate professor, Department of Pulmonary and Infectious Diseases
- [Morten H. Bestle](#), professor, Department of Anesthesiology/Intensive
- [Micha Phill Grønholm Jepsen](#), clinical associate professor, Department of Pulmonary and Infectious Diseases
- [Michael Frantz Howitz](#), clinical associate professor, Department of Ear, Nose and Throat