

REPORT FROM
AKERSHUS UNIVERSITY HOSPITAL
REGARDING RESEARCH
AT THE HOSPITAL LEVEL
(LEVEL 1)



SUMMARY/ EXCELLENCE

Akershus University Hospital (Ahus) has increased the research output since the nationwide research evaluation by the Norwegian Research Council in 2011. In short, we have increased the number of publications from 210 in 2011 to ~350 publications per year in 2016-2018 and from 8 finished Ph.D.'s in 2011 to 22 Ph.D.'s in 2018 (Table 1). We have also seen an increase in internal and external research funding, albeit with a stagnation during the last 3 years (Table 1). Accordingly, to advance research we will need to build on strategies that have proven successful and start new initiatives where Ahus has competitive advantages. We aim to utilize several avenues to recruit research talent in the continuum from basic research to clinical research to health service research to increase critical mass and reduce vulnerability of research groups. One new initiative will be to build and exploit complete data coverage (data warehouse) of patient groups, departments, and clinical divisions. We will focus on pragmatic clinical trials and use new initiatives for advancing clinical care (tjenesteinnovasjon) also for research. Our researcher community must secure additional external and internal funding and we will work to make research closely integrated with the hospital, including at the executive level.

1. INTRODUCTION

Ahus is a 1080 bed general and teaching hospital with a catchment area of ~560.000 inhabitants and main locations at Lørenskog and Kongsvinger and out-patient visits and planned surgery also at Ski. Research responsibility is harmonized with the hospital structure; hence, research output and control are part of the responsibility of the different divisions. All divisions today have a dedicated person responsible for research, but allocated time, resources for this work, and how research is organized differ between divisions (Fig. 1). Ahus has a Division of Research and Innovation that provides research- and regulatory support across the hospital (Fig. 1). Since 2017, the Division of Research and Innovation is led by the Director for research and innovation, whom is part of the board of directors at Ahus.

Research activity is closely linked to the University of Oslo (UiO). UiO has local administrative staff (Campus Ahus) and the Head of Campus Ahus attends the board of director meeting at Ahus. The research leadership and administrative staff at Ahus and Campus Ahus have close interactions and there are regular meetings between Ahus and Campus Ahus to regulate and facilitate research (Fig. 2).

The majority of senior research staff at Ahus have joint positions at Ahus and UiO, most commonly as Associate Professor or Adjunct Professor. In general, Ahus allocates 50% time to research and educational duties for all Associate Professor or Adjunct Professor positions (although UiO only provides funding for a 20% position). Most research staff outside of the academic positions are funded by external grants except for a small number of full-time research positions at the molecular biology laboratory (EpiGen) and the Health Service Research Unit (HØKH). Ahus also interacts with OsloMet on specific research projects, but no permanent academic positions are currently funded in collaboration with OsloMet.

Ahus was included in the nationwide research evaluation by the Norwegian Research Council in 2011. The main comments from the panels to Ahus on level #1 (hospital level) were:

Need for larger, more robust research groups	Build on current strengths
Too few full-time researchers	Need to increase internal funding
Should increase allocated time for research	Need to increase external funding
Need to better integrate research and clinical medicine	Need for career planning and lack of senior researcher positions

Ahus has followed some, but not all of these recommendations. The research activity has built on current strengths and the request for larger, more robust research groups have partly been fulfilled. In contrast, Ahus still needs more full-time researchers and senior research positions, and the allocated time for research and integration between research and clinical medicine should be increased. Funding of research is a major concern and lack of internal and external funding are considered major threats (revised SWOT; Table 2).

2. STATUS 2011-2019

Ahus has seen an improvement in research after the evaluation by the Norwegian Research Council in 2011. Current strategies are outlined in the strategic plan of Ahus (Utviklingsplan 2017-2030) and three main areas are of direct importance for research: (1) Ahus should increase specialized (regional) treatment (i.e. coronary angiography, cerebral thrombectomy, precision medicine in cancer); (2) Ahus needs to focus on recruitment and education of staff, and (3) Ahus should advance clinical care through research and innovation. The strategic plan also gives priority to these specific areas within research:

Clinical-oriented research should be the basis	Build strong, joint research infrastructure
All research disciplines should be performed	↑ biobanks and complete data coverage

Translational research is a priority	Support to the strongest research groups
Personnel with research competency should be recruited to clinical positions	Innovation with commercial potential should be given priority

Research at Ahus has followed most of these strategies, including focusing on clinically oriented research. Ahus also covers molecular biological research, which is mainly performed in the Section for Clinical Molecular Biology (EpiGen). Translational research has been advanced since 2011, both for projects across clinical disciplines like cardio-oncology, and for projects combining molecular and clinical studies. Some of the translational projects initiated at Ahus have resulted in start-up biotechnology companies like *PreDiagnostics* and *PreVention* (neurology) and *CardiNor* (cardiology). The company *SomSagt* also originates from Ahus, although no specific strategy or dedicated funding for research-driven innovation and commercialization have been established at Ahus.

Section for Clinical Molecular Biology (EpiGen) is an example of research infrastructure available to all researchers across disciplines and divisions at Ahus. The staff (all senior scientists, four paid by UiO and two by Ahus) contribute with technical assistance for in-house PIs and at present, all divisions have active projects at EpiGen. The staff also act as co-supervisors for clinical PhD candidates and contribute to grant applications with methodological competence as is illustrated by many grants won by Ahus PI involves collaborations with EpiGen. The research output from EpiGen has increased over time. EpiGen was appointed Regional Infrastructure for Translational Research in Helse Sør-Øst (HSØ) in 2016, and in this period 37 different PIs at Ahus, OUS, Sykehuset i Telemark, Vestre Viken, NMBU, NTNU and UiO have had activity at EpiGen. EpiGen has advanced the portfolio with state-of-the-art methodology in molecular medicine. Since 2013, EpiGen has systematically worked to build local competence on tumor-mutation panel sequencing, using both the Illumina and Ion Torrent platforms. The section has conducted pilot projects, trained staff scientists, and adopted bioinformatic pipelines for mutation calling and variant prediction developed by the Norwegian Cancer Genomic Consortium. Data sharing and storage solutions have been built and implemented in collaboration with the UiO service for secure data storage, TSD. Thus, we are at the stage that the technology and competence are available in-house for precision cancer medicine in research projects and clinical trials. Accordingly; EpiGen will be the node to advance translational research and research-driven innovation at Ahus. EpiGen is also the driving force for internationalization with two of three recent appointments to academic positions and most PhD and post-doctoral fellows being international recruits.

The Department of Research Support in the Division of Research and Innovation is another common infrastructure for researchers at Ahus. Until 2019, this unit mainly focused on administrative research support, including contracts with external funding bodies and research collaborators, contracts to PhD students, and finances related to external funding. The Department of Research Support has expanded their services after an internal revision in 2016 documented the need to strengthen control of research across the hospital. One new initiative has been regular educational seminars ("*Pakkeforløp for forskning*") that covers all aspects of clinical research, including regulatory requirements (Table 3). The Department of Research Support have also developed and implemented electronic reporting ("eSkjema") from November 2018, work that was performed in close collaboration with the Data Analysis group (Datafangst) at Ahus (organised in the Division of Finance). eSkjema is an electronic application for quality and research projects, and serves as a tool for internal control and GDPR (Fig 3). eSkjema will generate a database containing all projects initiated at Ahus and currently the Department of Research Support receives ~150 quality and research projects per year. In 2019, the Department of Research Support also expanded their portfolio by establishing the **Section for research support and innovation**. The new section provides additional support to the established research support system, including (*I*) Grants@ahus.no

where researchers get professional feedback on all aspects of external grant proposals, (2) a pool of clinical trial coordinators that support researcher- and industry-initiated clinical studies, and (3) more strategic capacity and possibility for direct support to innovation activities. Most recently, Ahus has dedicated rooms located in the center of the hospital to the **Research Outpatient Clinic**, which is included in the Section for research support and innovation. The Research Outpatient Clinic will be dedicated to performing researcher- and industry-initiated clinical trials and offer three rooms for patient visits and facilities for biobanking. However, it is a major concern that the capacity in essential support technology areas, such as pathology and imaging/radiology (CT/PET/MR), is already limiting research activity today. Accordingly, without increased focus and capacity for dedicated support infrastructure for research, this limitation will slow research development at Ahus. Still, better economy for Ahus should enable improved infrastructure, which will be of great value for diagnostics and research. The work to streamline all aspects of clinical studies at Ahus were presented in the Life Science report (*Helsenæringsmeldingen*) by the Ministry of Commerce in 2019 (Fig. 4). Other common research support at Ahus includes direct support relating to statistics, health economics, and general research questions from **HØKH**, which is organized in the Division of Research and Innovation. HØKH has provided this research support for years and all types of personnel at Ahus have received valuable help from HØKH. **Campus Ahus** also provides research support, but mainly to researchers with UiO affiliation.

Research infrastructure is not uniformly organized in the different divisions. A number of divisions have allocated funding for Departments for Research, but mainly with a limited number of dedicated staff (mainly 1-3 people). One exception is the **Department for Research in the Division of Medicine** that has 7 full-time dedicated research nurses and 2 other technical personnel. Historically, this unit has also provided some research support outside of the Division of Medicine. Maintenance and monitoring of biobank facilities are organized from EpiGen as joint ventures between Campus Ahus and Ahus, and the Department for Research, Division of Medicine oversees the electronic tracking solution for research biobanks (e-biobank) activity on behalf of the hospital.

No specific strategy or program has been implemented at the hospital level to support strong research groups. EpiGen receives direct funding from the Division of Research and Innovation and the Division of Medicine. Three of the leading research groups in the Division of Medicine has since 2009 received annual direct funding from the division. Ahus provides 6 million NOK per year for competition-based funding and these funds have been stable for the last 8 years. Ahus transfers all income from publications back to the divisions and the current overhead on external research grants is 15% with 7.5% transferred back to the divisions.

Thematic biobanks have been collected in different patient groups but currently there is a lack of electronic registration of biospecimens on the hospital level; i.e. biobanks are registered in local, in-house-made electronic depositories. There is a potential to better exploit and integrate complete data coverage (data warehouse) and systematic collection of biospecimens across large patient cohorts. The research community is not involved in a structured way during recruitment of personnel to clinical or executive positions.

3. PERSPECTIVES 2020-2025

To advance research, Ahus will build on strategies that have proven successful and start new initiatives where Ahus has competitive advantages. The research leadership will follow the strategic plan for Ahus 2017-2030 and prioritize efforts based on comments from the 2011 evaluation and this internal research evaluation.

We have updated the SWOT assessment of research at Ahus for this evaluation (Table 2). We find some changes compared to the SWOT assessment from 2011 (Table 4). The improved economic situation at Ahus and the systems implemented for real-time complete data coverage across the hospital (data warehouse) are new opportunities. We recognize lack of

integration between research and clinical medicine and few full-time researcher positions as weaknesses. Difficulty to prioritize research vs. clinical work and strong competition for internal and external funding are considered weaknesses and threats. Internal funding for research must be increased both for competitive project funding and annual funding to cover research infrastructure investments. The equipment park at EpiGen, which was funded by the University of Oslo in 2008, needs to be upgraded. There are currently limited possibilities to invest in new equipment required for EpiGen to remain a state-of-the art molecular laboratory. The Division of Research and Innovation has launched grants@ahus.no to increase external funding and we will strengthen this work towards 2025.

Infrastructure for research must be strengthened over the next period, and there is especially a need to strengthen research support systems in the individual divisions. We believe a key priority should be to fund full-time researchers in all divisions, whom should also carry the responsibility for research in the division and be included in the management team of the division. Ahus should focus on young post-doctoral researchers with active, top-level research for these positions. These research talents must be mentored and affiliated with strong clinical research groups to build critical mass for research. Such recruitment of young research talent would reduce the vulnerability of the research groups that depend on the continued success of a limited number of individual PIs to sustain funding. We will work along two avenues to attract talents: (1) cultivate talents among clinical doctors and (2) use our network to identify potential candidates with an early-stage track record sufficiently strong to win career grants. For the latter strategy, we will aim to develop stronger ties with Norwegian Centre for Molecular Medicine, which is a source of young research talent recruited internationally.

Hence, a modest investment in full-time researchers across all divisions, who have obligations for research leadership, should result in (1) more full-time researcher positions, (2) improved quality of research, and (3) better control of research. The research leader in the divisions also needs to work closely with research group leaders to ensure that all groups have regular meetings and strategies to increase competence and production. Based on the strategic plan for Ahus 2017-2030, successful research groups should receive direct funding to increase their quality. According to the management structure at Ahus, the Division of Research and Innovation defines the targets for research output and the progress will be monitored as part of the regular program for internal revision at Ahus (“Orden i eget Ahus/ resultatsikring”).

Dedicated research personnel in each division should also include personnel and resources to alleviate the capacity-limitation in essential support technology areas, such as pathology and imaging/radiology (CT/PET/MR). Investments in diagnostic capacity helps Ahus to make full use of additional research support infrastructure such as the Research Outpatient Clinic, and capacity in technology areas should therefore be prioritized.

The Division of Research and Innovation will prioritize targeted strategic work to build stronger, more robust research environments and increase interdisciplinarity. We believe structured arenas for interaction between academic personnel (“Academy Ahus”) and programs for mentoring young research talents (“Team Ahus”) could increase the quality of research at Ahus. Such arenas for interaction should foster translational perspectives and build a stronger culture for top-level research. Full-time researchers in all divisions will enable the research community to get more involved in recruitment to all types of positions, which is a prerequisite to increase the number of active researchers at Ahus. To increase critical mass for research, and to establish basic/translational research groups, Ahus should collaborate locally, regionally, nationally, and internationally. Ahus should also attract more medical students from UiO and establish permanent academic positions in collaboration with OsloMet. Permanent academic positions with OsloMet is considered a requirement to develop non-MD research and young non-MD researchers should be mentored and connected to strong clinical research groups at Ahus, and especially to HØKH that has a portfolio of related projects. Translational research also needs to be advanced and Ahus should increase the visibility of

EpiGen in the Life Science environment in greater Oslo region. Ahus should support local initiatives to expand Life Science innovation and especially work to establish more collaboration with IFE (*Institutt for energiteknikk*). New buildings at Ahus must include plans for research, education, and innovation to strengthen Ahus as a center for education and Life Science innovation in the region.

One great opportunity at Ahus to increase research production during the next period is through pragmatic clinical trials. Pragmatic clinical trials use designs from randomized-controlled trials in general hospital wards to test already implemented strategies head-to-head with an intent to inform decision-makers concerning the best strategy for real-life patients. Ahus has some characteristics that should make pragmatic trials especially powerful in our hospital, including the established local data warehouse (QlikLis and KPP) and a large catchment area of unselected patients (currently ~560.000/ 10% of the Norwegian population). Data warehouse solutions will automatically provide a real-time, complete list of eligible patients (identified by pre-defined characteristics or ordering of specific tests), regardless of time for hospital admission and location in the hospital. Hence, we envision to use data warehouse as an automatic source to obtain large-scale data for epidemiological and health services research, and to obtain complete, automatic patient identification for recruitment of patients into clinical trials. By integrating data warehouse solutions and systems for randomization with electronic patient systems, Ahus has the opportunity to develop a system to perform large-scale pragmatic clinical trials. We will encourage simple, non-pharmacological interventions to increase volume, but also look for high impact pragmatic trials when new treatment strategies are implemented earlier in Norway than in other countries. The Division of Research and Innovation will allocate resources to support all phases of pragmatic trials, including support to obtain approvals, project development, randomization, and execution, and we will work with motivated departments to start pragmatic trials. Ahus heads the work package on *New strategies for clinical trials* in NorCRIN2 and this work will be integrated with the program to start pragmatic trials at Ahus.

The combination of data warehouse solutions and large volumes of clinically collected biospecimens should enable Ahus to build comprehensive biobanks fast and at a low cost. Ahus could increase success rate for external funding by having better registration of already collected biomaterial, and by enabling translational research talents to access biobanks at Ahus. However, this will require better registration of biomaterial at Ahus and a culture of sharing material between researchers and research groups. Currently, running costs for storage of biomaterial is carried by the individual research groups and it is likely that this influences the motivation of groups to share biomaterial. Hence; Ahus should consider to define some databases/registries and biobanks as prioritized cohorts that are covered by hospital funding and made universally accessible to researchers at Ahus, and possibly also outside of Ahus. Additional funding is required to extract the maximum value of this work, but this should be considered as this initiative would help attract young, translational research talents to Ahus, improve the success rate for external research funding, and position Ahus in the Life Science strategy of UiO, which currently do not have a dedicated plan to secure access to large-scale clinical material with extensive phenotyping.

4. CONCLUSION

Research at Ahus has been improved since the evaluation in 2011. To further advance research, we will build on strategies that have proven successful and start new initiatives. We aim to recruit and mentor research talent from basic to clinical to health service research and we will utilize local data warehouse and pragmatic clinical trial strategies to increase quantity and quality of research. We believe all divisions should recruit full-time researchers and we will work to integrate data warehouse solutions, databases/ registries, and biobanks, which should prove valuable for researchers both internally and externally.

APPENDIX

Table 1. Research activity at Akershus University Hospital 2011 – Oct. 2019

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. of employees	N.A	N.A	300	372	447	501	568	568		
FTEs*	96,1	105,5	131,3	153,7	169,3	195,1	194	194		
Research funding**	39	32	57	53	89	100	97	83	57	
PhDs	8	20	10	15	17	9	16	22	11***	
Publications	210	238	228	238	285	363	358	323	196***	
Industry initiated clinical trials	N.A	N.A	N.A	5	15	20	24	20	9***	
Investigator initiated clinical trials	N.A	N.A	N.A	12	21	24	19	27	12***	

* Full time equivalents (FTE) From NIFU Step

** In millions

***Per 31. October 2019

Table 2. SWOT analysis 2019

Strengths	Weakness
<ul style="list-style-type: none">• Young, ambitious, competent academic staff• Improved research support systems• Some strong research groups	<ul style="list-style-type: none">• Uneven quality of research• Challenging to prioritize research over clinical medicine• Few full-time researchers• Lack of integration between research and clinical medicine
Opportunities	Threats
<ul style="list-style-type: none">• Large catchment area• Unselected patients• Better economy for Ahus• Systems for complete data coverage (data warehouse)• Collaboration with strong research institutions	<ul style="list-style-type: none">• Research talents gravitate towards other institutions• Strong competition for internal and external funding• No defined strategy and dedicated funding to invest in and renew research infrastructure

Table 3. Agenda for research seminar “Pakkeforløp for Forskning”

Agenda – 16. oktober 2019

Pakkeforløp for forskning

Kl. 12.00 – 12.15	Velkommen og formål med kurset Organisering og ansvar i forskning
Kl. 12.15 -13.15	Kontrakthjelp og juridisk veiledning Administrativ forskningsstøtte Arkivering av forskningsdokumenter Forskningsadministrasjon: prosjektøkonomi og personal Litteratursøk og veiledning v/medisinsk bibliotek Søknadsstøttetilbudet grants@ahus.no
Kl. 13.15 – 13.30	Forskningsformidling
Kl. 13.30 – 13.45	PAUSE
Kl. 13.45 – 14.30	Personvern, Forskningsetikk og biobank
Kl. 14.30 – 14.45	«Pakkeforløp» for kliniske behandlingsstudier og klinisk forskningspoliklinikk
Kl. 14.45 – 15.00	Klinisk forskningsenhet, Medisinsk divisjon
Kl. 15.00 – 15.15	Forskningsinfrastruktur ved EpiGen
Kl. 15.15 – 15.30	Uttrekk og lagring av forskningsdata
Kl. 15.30	Avslutning og anledning til å stille spørsmål

Table 4. SWOT analysis 2011

Strengths	Weakness
<ul style="list-style-type: none"> • Young, ambitious, competent academic staff • New, modern hospital and laboratory facilities • Research prioritized field among hospital leaders 	<ul style="list-style-type: none"> • Young academic institution • Uneven quality of research • Competitive disadvantage compared to OUS wrt recruitment of academic personell
Opportunities	Threats
<ul style="list-style-type: none"> • Proximity to and collaboration with OUS • Competitive advantages in clinical and outcomes research (i.e. Large catchment area) 	<ul style="list-style-type: none"> • Research talents gravitate towards OUS • Unwillingness of OUS to share academic resources

Fig. 1. Organization of research at Akershus University Hospital

05.08.2019

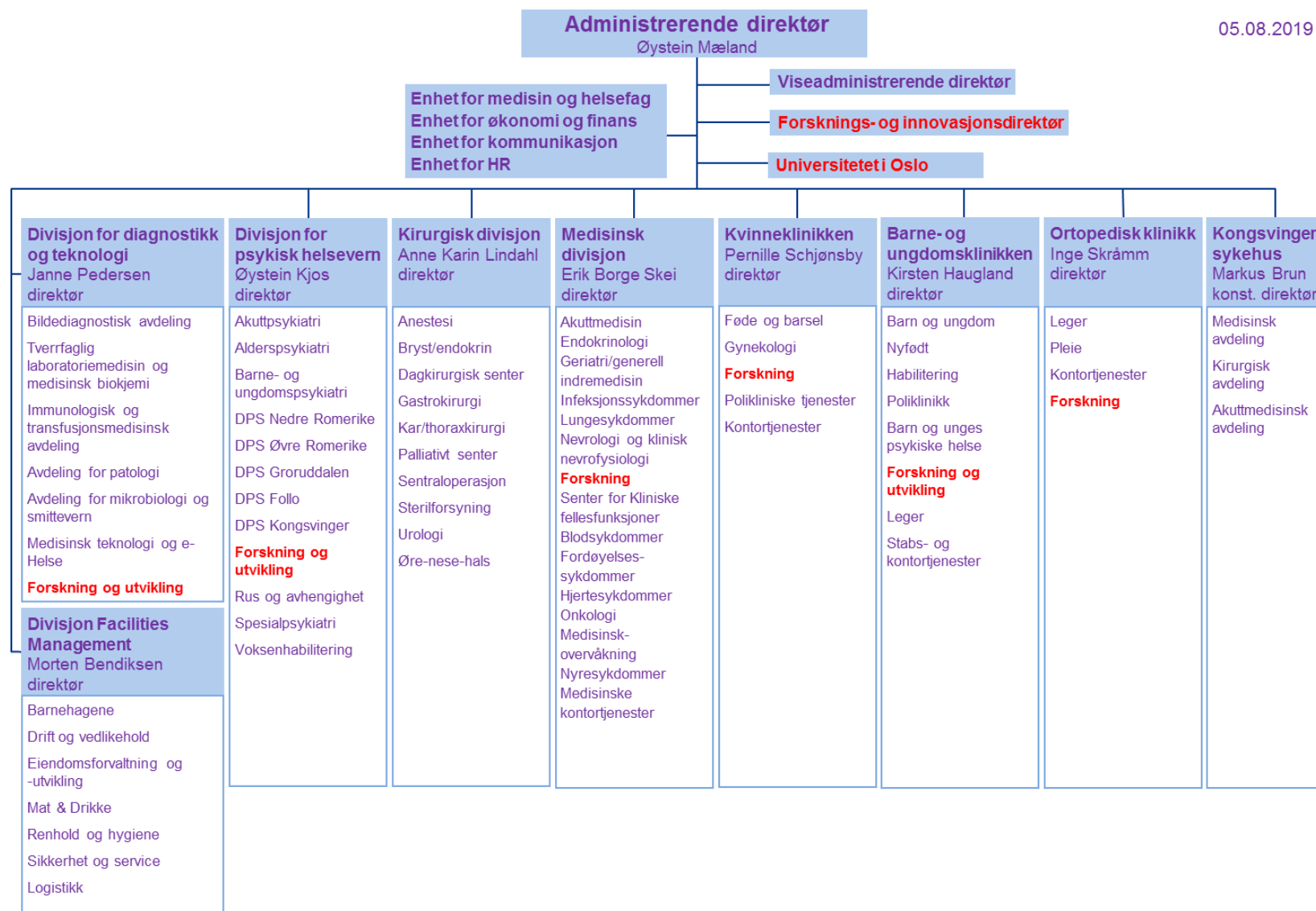


Fig. 2. Research structure and interaction with UiO

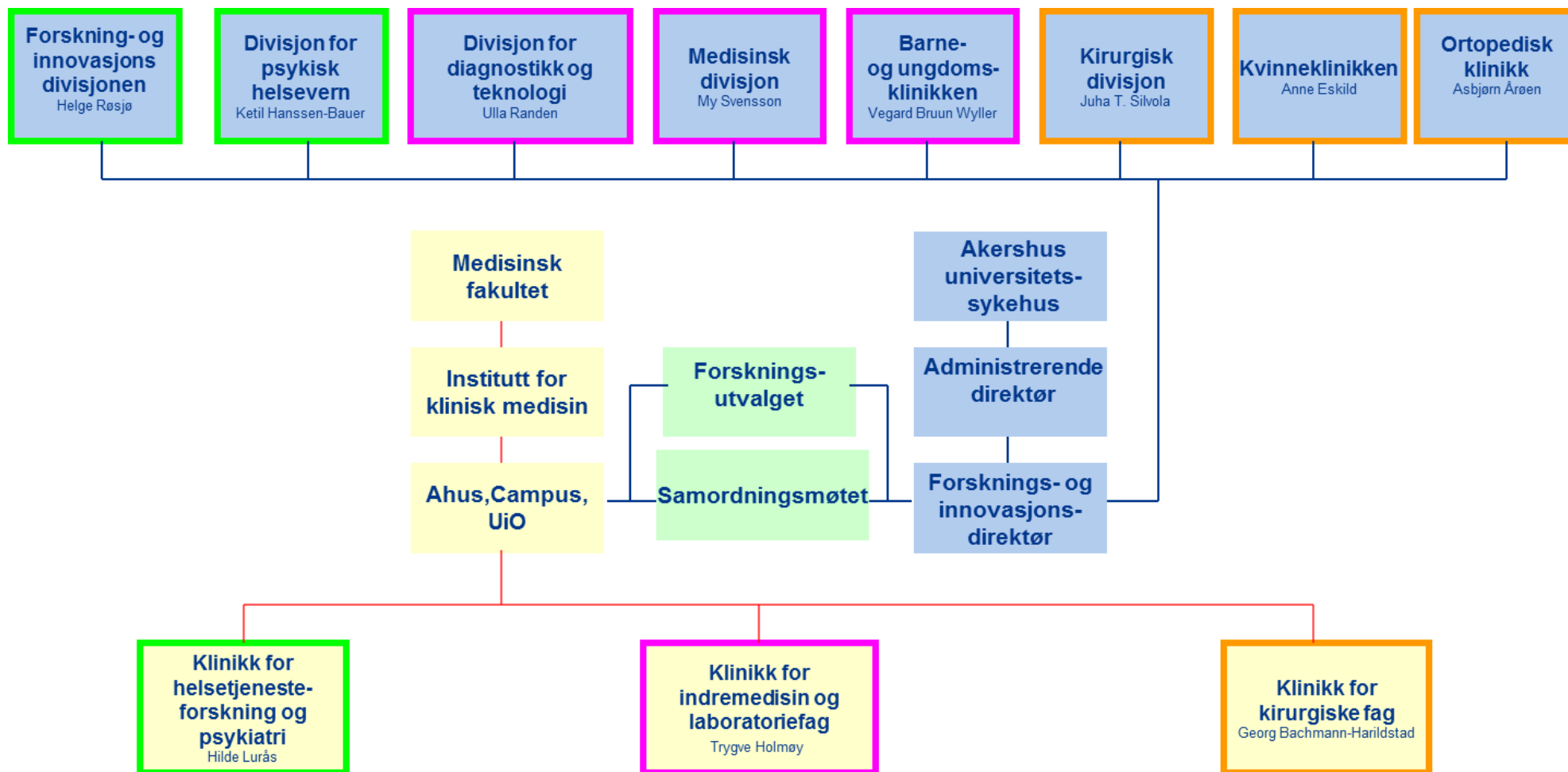


Fig. 3. eSkjema

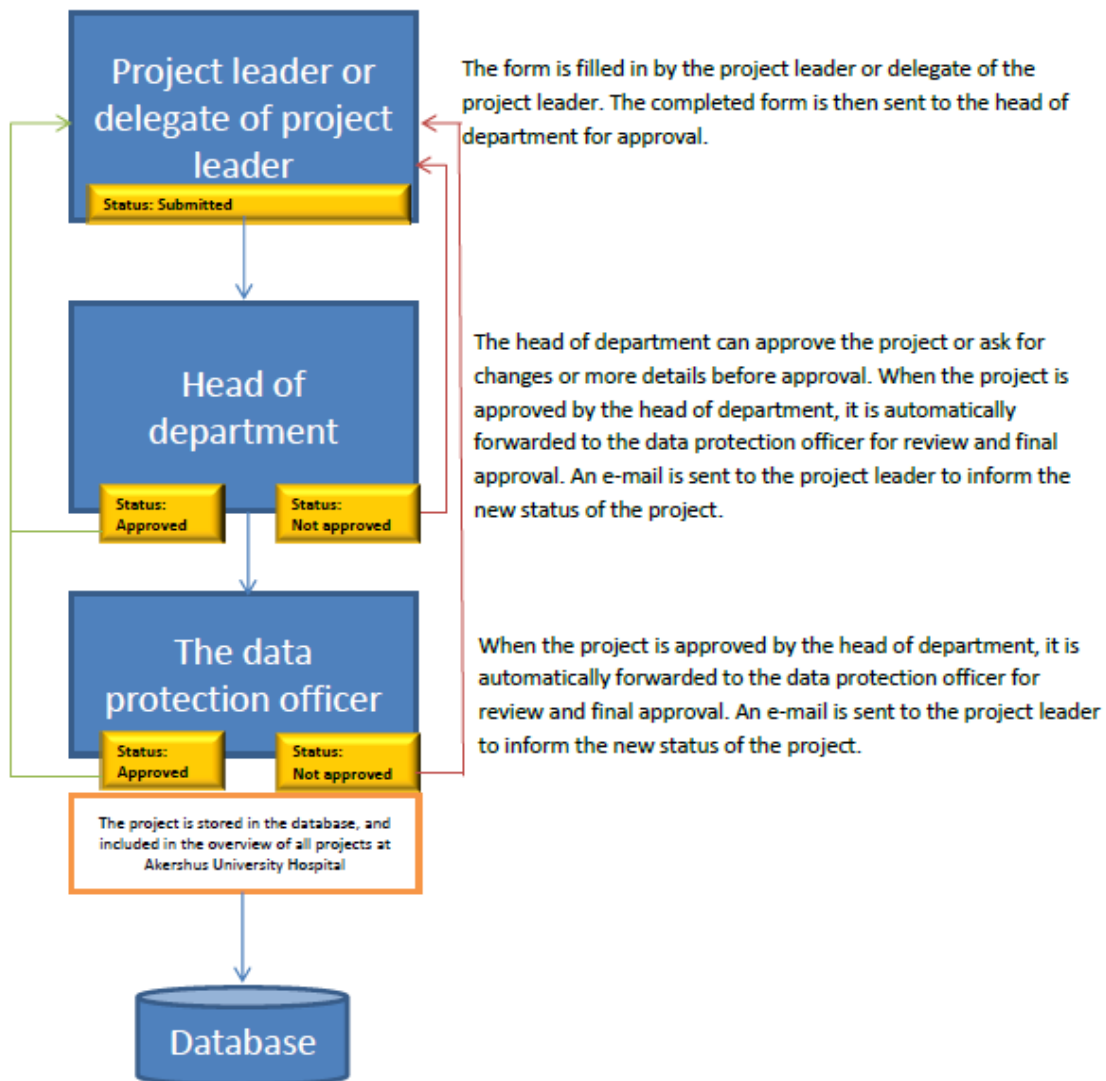


Fig. 4. Illustration of coordinated plan for clinical interventional projects

