

Title

Research hospitals in collaborative innovation

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In this paper we report an empirical investigation from Norway looking at the following question:

What is the role of research hospitals in collaborative research and innovation centres?

This is an important question for several reasons. First, hospitals remain an understudied actor in the empirical literature on innovation in the life sciences, even though they are seen as a key actor in the distributed health innovation system (e.g. Morlacchi & Nelson 2011; Djellal & Gallouj 2005; Windrum & Garcia-Goñi 2008, Gittelman 2012). Consoli & Mina (2009:307) argue that “Research hospitals (...) are especially important institutions”, granting them a complex role in scientific knowledge diffusion, practical feedback and interorganisational network creation. Second, life science is the largest field of research in most countries. In Norway, for example life science totals almost one-fourth of the national R&D effort in all sectors combined. A large proportion of this R&D is carried out within the research hospitals, yet they are typically much less studied than firms and universities. Third, there is still a belief that medical innovation is something distinct – that it is more closely and directly based on scientific discoveries and breakthroughs. This view remains a strong influence on policy-making, despite a number of important investigations that have shown how medical innovation probably is best described as equally non-linear, systemic, evolutionary and complex as found in other sectors (in addition to the above, see e.g. Rosenberg 2009; Blume 1992; Nelson et al. 2011; Gittelman 2012).

A research hospital or academic medical centre is normally affiliated with a university, and it usually has special functions that separate it from other hospitals. It is often fairly large and with clinical and sometimes basic biomedical research tasks in addition to the provision of medical and related services as well as having extensive teaching functions (see Djellal & Gallouj 2005). These activities are organised in different ways. The university affiliation means that there are shared facilities, personnel in hybrid/adjunct positions, joint projects and more. Since health systems vary considerably between countries, not least in the share of the health service providers that are public or private, it may be assumed that hospitals are fairly heterogeneous when it comes to organisation, funding sources and governance. From this it follows that their role in innovation collaboration may differ as well. Some hospitals may predominantly act as users, providing practice-based inputs into innovation processes. Others may have a stronger part in the creation of scientific knowledge, in the development of medical technologies, or in experiments with the interface between technological and organisational aspects of innovation. These different roles and the extent to which they are changing as a result of a stronger policy focus on innovation in the health sector are questions we explore in this paper.

Our theoretical framework is based on the evolutionary and systemic perspectives mentioned above, where many important characteristics of medical innovation have been put forward and refined. But although much progress has been made in conceptualising innovation in and around hospitals, their role remains rather obscure in the theoretical frameworks that have been set up (such as Djellal & Gallouj 2005; Windrum & Garcia-Goñi 2008). Evolutionary frameworks have been tested looking at historical case studies of specific medical treatments or bibliometric analyses (Morlacchi & Nelson 2009; Consoli & Mina 2009). With these studies

as a starting point, we aim to expand the empirical basis for discussing the role of hospitals in innovation.

Main data source for the paper is a comprehensive multiple case study of five Norwegian Centres for Research-based Innovation (CRI) within life science (per December 2012 data collection for three of the five cases has been finalised). We have studied application documents, underway reporting, evaluations, consortium agreements, and we have carried out between 15 and 20 interviews in each centre. The centres receive comprehensive funding for an 8-year period (up to around 5 million Euros annually) with clear expectations of generating medical innovations. They are defined both with scientific goals, innovation goals and health system related goals such as reducing costs or making treatments more efficient. All CRIs are required to have partners from private industry. The names and basic organisation of the centres are as follows:

- Centre for Marine Bioactives and Drug Discovery, hosted by a university, the research hospital in a rather minor role mainly through joint positions and some individual researchers.
- Medical Imaging Laboratory, hosted by a university, the research hospital receives some of the funding and is the main venue for testing new equipment and procedures.
- Cancer Stem Cell Innovation Centre, hosted by a research hospital, a strong science-based research agenda with a clear aim of commercialisation.
- Telemedicine Laboratory, hosted by a research hospital which aims to create new technology in collaboration with the partners.
- Centre for Cardiological Innovation, hosted by a research hospital, is also oriented at medical imaging but with a more clinical (rather than technological) approach and specialising in cardiac diseases.

Our cases encompass three Norwegian universities and three research hospitals as well as a large number of firms within biotechnology, medical technologies and pharmaceutical industry and in a few cases regional health authorities who are also the owners of the hospitals. In addition to these case studies, the final paper will use an analysis of policy documents concerning health sector innovation highlighting how hospitals are conceptualised as innovation agents. We may also include some aspects of a disclosure of invention database from Norway's largest technology transfer office. This office receives ideas from several universities and hospitals, and the database may help shed a light on the emergence and evolution of ideas at the intersection of the two types of organisations.

The main empirical analysis will nevertheless be to explore the five case studies, where our initial impressions are a great heterogeneity both when it comes to context, the problems the centres aim to solve, how they envisage solutions and how they try (or aim) to implement them. Even if the centres receive funding from the same funding scheme, they seem to operate with highly different models of the innovation process. Explanations are most likely related both to the scientific and technological context, the regional challenges, the pre-existing networks between actors, and the organisation of the hospital.

Research hospitals seem to be flexible partners in collaborative innovation, and their roles in the centres vary a lot from case to case. We have previously mapped university-industry

relations within medical innovation centres hosted by universities on a scale representing different degrees of contact, distinguishing between five types (see Thune, Gulbrandsen et al. 2012):

- “Seamless web interaction” (mutual R&D involving several people in each organisation)
- “Coordinated activities” (R&D/innovation activities found in both organisations thematically related and coordinated)
- “Parallel projects” (R&D in both organisations, few attempts at harmonising agendas, some gatekeepers represent contact points)
- “Positive attitudes” (R&D at the university, companies display interest and participate informally and in some meetings, but no active involvement)
- “Purely symbolic interaction” (no R&D in the company, only formal meeting places such as annual partner workshop, no significant gatekeeper).

Expanding this to include hospitals, the picture becomes more complex as the research hospitals host some of the centres. Their role is in some instances to involve other actors and facilitate collaboration and commercialisation, in other instances to fulfil the role as a rather minor partner. Personnel in dual positions seem to be important gatekeepers. A major background factor seems to be the economic situation of many hospitals; faced with demands to cut costs, their incentives to act as hosts seem to increase while their role as partners may become more difficult as they can offer little more than in-kind contributions where the individual researchers and doctors’ time is under strain. Access to state-of-the-art technology and training of personnel seem to be central motives to become partners in collaborative innovation, more than innovation/adoption at the hospital per se.

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