

Factors Enabling Innovation Activities: Combining Perspectives of Personnel and Management of a Public University Hospital

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Abstract

Innovation activities are actions intended to generate innovations, and innovations are novel, implemented items or actions, that improve processes. The research on enabling innovation activities in public hospitals is limited. This study identified key factors that enable innovation activities by combining statements made by representatives from management (n=13) and personnel (n=9) at one Finnish public university hospital. The study used semi-structured interviews and content analysis. According to the results, unified and authorised practices are needed to counterbalance and organise the extreme complexity typical of public hospitals. Both, hospital personnel and management called for assistance with complementary expertise in innovation management.

Keywords: Innovation; innovation activities; innovation leadership; innovation management; healthcare; public hospital; university hospital; organisational learning; complexity; content analysis.

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1 Introduction

The healthcare system faces enormous challenges due to a retiring workforce, an aging population and cost-effectiveness requirements combined with expectations for high-quality care. Rapidly changing political, economic, and technological conditions require healthcare organisations to contemplate strategic change as well as the development and use of innovations (Ordanini and Parasuraman, 2011; Schultz et al., 2012; Aro and Heiskala, 2015). Healthcare organisations are expected to take advantage of the latest technology and related knowledge development (Länsisalmi et al., 2006; Thakur et al., 2012) while complying with regulatory and cost constraints (Duarte et al., 2014). In Finland, additional challenges are due by uneven social, regional and economic development, and financial resources not growing at the same pace as the need for the services (Aro and Heiskala, 2015).

In healthcare, innovations are viewed as novel, implemented work methods, services or technologies (Länsisalmi et al., 2006) aimed at improving the efficiency and economy of healthcare, end-user experiences, and the health effects of services (Greenhalgh et al., 2004). The term *innovation activities* refers to all organisational, technological, financial, scientific and commercial steps that lead, or are intended to lead, to the implementation of innovations (Organisation for Economic Co-operation and Development, 2005). The importance of innovations as a success factor in both private and public organisations has been repeatedly demonstrated in theory and in management practices (Masood and Afsar, 2017; Jończyk and Olszewska, 2016; Wang, 2015). Innovations are becoming a key factor in improving hospital services (Duarte et al., 2014; Labitzke et al., 2014; Dobrzykowski et al., 2015; Wu and Hsieh, 2015) as they help hospitals meet external and internal demands (Länsisalmi et al., 2006; Salge and Vera, 2009; Schultz et al., 2012) and identify creative new approaches (Duarte et al., 2014; Piening, 2011). However, innovation management is only implemented in a few hospitals (Labitzke et al., 2014).

Public hospitals have faced challenges deploying innovation activities (Aoun et al., 2018). Traditional practices, management, and the culture of public hospitals are examples of characteristics that may produce these challenges (Philips and Andrew, 2006). Public hospitals are often described as *complex systems* for which it is difficult to predict the effects of new initiatives with any certainty. Continuous learning is necessary in constantly evolving, knowledge-intensive environments (Lönnqvist and Laihonen, 2017). Public hospitals are also multidisciplinary organisations where innovation activities can be hampered by social and cognitive boundaries between occupational groups (Ferlie et al. 2005) which may cause frustration and lack of support for innovation activities. (Williams, 2011). Public hospitals can overcome obstacles to deploying innovation activities by learning new practices (Wu and Shieh, 2015; Edwards-Schachter et al., 2012); concentrating on facilitating the involvement of various stakeholders; and conceiving new ways to overcome barriers and hindrances typical of hospital organisations (Moreira et al. 2017; Labitzke et al., 2014). This also helps hospital personnel commit and get involved (Philips and Andrew, 2006).

Research on enabling innovation activities in public hospitals is scarce (Jończyk and Olszewska, 2016). Several studies on the private sector have described the prerequisites for innovation activities but, for public organisations, only a few studies have attempted to identify factors predicting the emergence of innovations, test innovation models (Jaskyte, 2011), or determine the reasons behind variations in innovation activity between public sector organisations (Demircioglu and Audretsch 2017). New knowledge is needed to overcome the difficulties experienced by public hospitals and to improve successful deployment of innovation activities (Hyrkäs et al., 2020; Luo et al., 2014; Plsek, 2003).

Public hospitals employ several internal stakeholder groups, including multiple occupational groups and management levels, whose views on the conditions for innovation activities may differ or complement each other. Previous research focuses on describing the experiences of individual internal stakeholder groups from limited perspectives. This study continues the scientific discussion and supports practical implications of innovation activities and their management in public hospitals by addressing the following research question: *what key factors enable innovation activities in a public university hospital?* The study contributes to the theory of innovation management as part of knowledge management by summing up the perspectives of managers representing various levels of hospital management and several hospital personnel groups, thereby giving a more holistic view of how innovation activities may be enabled in public hospitals.

2 Innovation activities in public hospitals

2.1 Context-specific characteristics affecting innovation activities in public hospitals

Public hospitals are large, complex, dynamic organisations aiming to provide citizens with health services (Greene et al., 2012; Bloch and Bugge, 2013). There are many sources of hospital complexity. First, they handle a wide range of healthcare professions and occupational groups which results in versatile expertise and specialization but, also, a diverse organisational culture. (Wang, 2015; Cleven et al., 2016). Second, traditional arrangements of hospital operations into clinical specialties and specialized functional units further increases the complexity (Cleven et al., 2016). In addition, today's hospital services use a wide variety of technologies that must be operated by specialized resourceful personnel. Diverse care pathways also create a wide variety of work tasks that require extensive integration and coordination (Greene et al., 2012). Moreover, public hospitals objectives are numerous, multidimensional and often difficult to reconcile, as exemplified by simultaneous demands for equality, efficiency and equity in hospital operations (Wang, 2015). Public hospital activities include, for example, accounting for ethical considerations, working for and with people, difficulties determining success criteria, fear of failure, and reliance on external funding (Jaskyte 2011).

Innovation development is also complex and dynamic (Wang, 2015; Chesbrough, 2018). Innovation activities require a strong sense of responsibility from personnel and active adaptation of end-user perspectives, which is contrary to the typical, remote and neutral approach characteristic of the public sector (Veenswijk, 2005). For example in Finland, it is typical that development processes, including actions developing innovations and innovation activities, are organised as projects. Too often, when projects end, little attention is paid to the implementation of new, developed practices, the key-persons move into new assignments and new knowledge is lost. In addition, new solutions and information are difficult to disseminate because of the size of the healthcare sector. (Aro and Heiskala, 2015.)

Public hospitals have historically been characterised by a rigid hierarchy, strong professional boundaries (Kajamaa, 2015), high formality, low flexibility (Dias and Escoval, 2013) and strictly-regulated decision-making (Wang, 2015) particularly regarding resource allocation (Bloch and Bugge 2013). Public hospitals are widely considered traditional systems with low tolerance for unpredictability (Jończyk and Olszewska, 2016) but innovation activities are fraught with uncertainty (Jalonen, 2012) and require managers to take risks (Veenswijk, 2005). Doctors and nurses face challenges when expressing their opinions to hospital management which, in turn, hinders innovation activities (Jończyk and Olszewska, 2016).

Indeed, hospitals are even described as the most complex type of hierarchical social organisation where competition for resources, professional differences, and hierarchical management practices impede innovation activities (Iedema, 2007). The characteristics of public hospital contexts may hamper open collaboration between stakeholders and the willingness of personnel to share ideas, thus weakening the organisation's ability to innovate (Kajamaa, 2015; Labitzke, 2015). One major barrier to innovation activities comprises perceived communication gaps within hospital organisations and with external stakeholders. Innovation processes usually require combining multiple types of knowledge or different patterns of thought (Kinkel et al., 2017). However, the expertise required for innovation activities is not readily available for use by hospital departments and for innovation collaboration with external partners, partly due to complex administrative structures and rapidly changing environments. (Dias and Escoval, 2013.)

Public sector innovation activities are generally considered in the literature from the perspective of the private sector (Bloch, 2016, p. 1467; Demircioglu and Audretsch, 2017). However, public organisations face unique challenges that may hamper innovation efforts, and innovation models developed for the private sector may not directly transfer to non-profit organisational contexts (Jaskyte 2011). Some researchers argue that increasing interest in innovation activities is slowly affecting methods of public sector management, and that an emphasis on the cooperation required for innovation activities may gradually generate a new, community-based leadership paradigm (Hess and Adams, 2007).

2.2 Prerequisites for innovation activities in public hospitals

In order for innovation activities to be successful in public hospitals, their personnel must be able to: innovate, learn new techniques and procedures for all operations offered at the organisation (Wu and Shieh, 2015), and further develop knowledge (Khedhaouria and Jamal, 2015). Research literature emphasises knowledge management, trust-building between participants, investment in communication, and focus on the end-users as prerequisites for successful innovation activities (Dias and Escoval, 2012). In addition, collaboration and various partnerships between internal and external stakeholders are often necessary for success in innovation activities (Barnett et al., 2011; Dobrzykowski et al., 2015). Innovators highlight the importance of receiving feedback on innovation activities (Barnett et al., 2011). Länsisalmi et al. (2006) found, in their systematic literature review, that: strong leadership with shared and clear objectives, participation and reflectivity, correct timing, task orientation, active internal marketing, motivation and participation of personnel, sufficient resources (personal, financial and instrumental) and lack of stress all seem to positively impact innovation activities in healthcare organisations.

Organisational management and strategies influence hospital innovation activities (Demircioglu, 2017), and management support is key for organisational innovation success (Duarte et al., 2014; Boscherini et al., 2013; Schultz et al., 2012; Williams, 2011; Barnett et al., 2011). Hospitals that are successful at innovation activities commit to innovation management by incorporating innovation activities into their vision, mission and values and implementing activities at the organisation according to current norms, values and strategic plans (Duarte et al. 2014; Barnett et al. 2011). An understanding of an overall picture of innovation activities enables participants to become more involved in innovation creation (Luo, 2015). Besides enabling culture (McDonald, 2007), clear motivational goals and resource allocation also enhance innovation activities (Duarte et al., 2014).

Management and leadership practices influence the innovativeness of public hospital personnel (Salas-Vallina et al., 2018; Günzel-Jensen et al., 2018; Bagheri and Akbari, 2018; Masood and Afsar, 2017; Weng et al., 2015). For example, Günzel-Jensen et al. (2018) argue

that empowering leadership is a strong predictor of innovative employee behaviour, and that appropriate management practices and facilitation of employee self-leadership are precursors to success in innovation activities in the public sector (Günzel-Jensen et al., 2018). Managers should help personnel develop “innovation skills” (Aoun et al., 2018). According to Birken et al. (2012), managers’ roles in innovation activities of healthcare organisations are to model and facilitate activities and monitor strategy implementation. Moreover, according to Duarte et al. (2012) the managers’ role is to shape the organisational structure, including attitudes toward stakeholder involvement, and to support innovation activities (Birken et al., 2012; Duarte et al., 2012). Managers’ roles as inspirer of personnel and as supervisor of sustainability and efficiency are also acknowledged as important (Birken et al., 2012), and other roles involve integration of innovation activities into hospital management systems and creation of operational support mechanisms, such as reward and evaluation systems (Duarte et al., 2014). Therefore, hospital management should consider use of monitoring and reporting mechanisms for increased innovation (Labitzke et al., 2014; Barnett et al., 2011).

To enable innovation activities, all managers must be prepared to support change (Berwick, 2003). Also, distinct management levels have been identified as having varying roles in hospital innovation activities (Engle et al., 2017). Birken et al. (2012) suggest that middle management is a key player between senior management and hospital frontline personnel, with roles involving information dissemination and assurance of strategic consistency throughout activities. Duarte et al. (2014) argue that the senior management roles, in turn, are to support and plan innovation activities. Senior management links the objectives of innovation activities with the organisational strategy (Duarte et al., 2014). Research literature suggests that certain organisational principles may be central to enabling innovation, including delegation of power, reduction of hierarchy, and promotion of collaboration between hospital units (Dias and Escoval, 2013). In addition, decentralization of decision-making, collaboration between organisational functions and vertical integration of management levels support innovation activities (Kapoor, 2013).

It is particularly important that innovators themselves are passionate and committed to innovation activities (Barnett et al., 2011). Comprehensive engagement of hospital personnel and other end-users may help the innovation meet user needs (Bekkers and Tummers, 2017). Insufficient resources or fear of inadequacy diminish participants’ contributions to innovation activities (Barnett et al., 2011). Innovation capacity is enhanced by active communication, trust, and empowerment of healthcare professionals at all hospital levels, which enables adequate space for creativity (Dias and Escoval, 2012). In order to enable innovation activities, creation of an open and inclusive atmosphere may be useful (Brimhall and Mor Barak, 2018).

Hospitals are part of various networks to which they bring specific knowledge and skills. Innovation activities also occur through interaction between and co-creation by internal and external hospital stakeholders and, thus, require hospitals to draw on information from other health services and sectors (Dias and Escoval, 2012; Pikkariainen et al., 2020). Some studies encourage hospitals to implement internal support functions and tools (Haukipuro and Väinämö, 2019) that facilitate collaboration and involvement of varying stakeholders and hierarchical levels, and to provide ways of removing typical hindrances of hospital organisations (Moreira et al., 2017; Labitzke et al., 2014).

3 Methods and data

3.1 The Pilot

This study was conducted at a single public hospital in Finland, Oulu University Hospital (OYS) and on the year-long YSI University Hospitals as Innovation Platforms project (2016-2017, hereafter referred to as “the Pilot”) (Hyrkäs et al., 2020). OYS, as the northernmost of five central university hospitals, delivers specialized healthcare services to Northern Ostrobothnia and provides highly-specialized medical services to all of northern Finland.

In the Pilot, the public university hospital, together with the local university (University of Oulu), operated as process owners by developing and piloting a co-creation model for healthcare innovation activities. The Pilot was implemented by a wide range of hospital professionals (management and personnel, including nurses, doctors and other experts, n=100+) and companies (n=5) aiming to provide healthcare products and services. Other organisations in the ecosystem surrounding the hospital also participated in the Pilot by providing feedback.

The Pilot was built around two main objectives. First, a nationally-exploitable model of healthcare need-based co-creation was generated to support cooperation on innovation between hospitals, businesses and other regional stakeholders. Second, an initial nationwide model for innovation activities in the public hospital context was developed based on a wide range of research data collection. The results of the second objective are described and reported in this study. In addition to the main objectives, the Pilot was expected to produce innovations designed to meet the needs identified by hospital management and personnel.

In practice, an innovation process (the Pilot) was carried out, starting with identification and selection of hospital development needs and involving hospital management and personnel as key experts. The next phase involved innovation competition, in which companies were chosen to solve the needs presented. Thereafter, hospital personnel and the selected companies co-created new hospital services with support from innovation experts of the hospital (n=6) and of the university (n=7). Co-creation workshops and other activities were conducted, and data collection was included for all activities. One main aim during the Pilot implementation was to find the best possible conditions for hospital management and personnel to engage in and contribute to innovation activities. As a main result of the Pilot, a nationally-applicable innovation model was generated for Finnish hospitals (Hyrkäs et al., 2020; Haukipuro et al., 2018).

3.2 Study design

This study continues the scientific discussion and supports practical implications of innovation activities and their management in public hospitals by addressing the following research question: *what key factors enable innovation activities in a public university hospital?*

The study was conducted between 2017 and 2019. Study results were obtained from the primary and secondary data sources described in Table 1. The primary research data consisted of content from semi-structured interviews of public hospital managers (n=13) and personnel such as nurses, doctors, experts of hospital pharmacy and IT-administration (n=9). Numbers of interviewees by position are presented in Table 2. The average duration of an interview was one hour (between 40 and 80 minutes). The criterion for participation was that selected interview respondents for this research were most actively involved in the case under investigation and were therefore the best subject matter experts. The researcher sought participants with as much experience and knowledge in the subject matter as possible. The interviews were conducted according to general themes that fulfilled both main objectives of the Pilot: to generate a healthcare need-based co-creation model for innovation collaboration of hospitals, private companies and other stakeholders, and to design a comprehensive model for innovation activities appropriate for the public hospital context. In addition, more specific

questions were presented as needed (Polit and Beck, 2012). The interviews were recorded and transcribed for analysis. Feedback surveys from co-creation workshops of the Pilot and research findings gathered at project group meetings were used as secondary sources of information in this study.

Table 1 Description of the data used in the study

<i>Research data</i>	<i>n</i>	<i>Type</i>	<i>Primary / secondary</i>
Semi-structured interviews of public hospital personnel	9	Interview of key informant	Primary
Semi-structured interviews of public hospital management	13	Interview of key informant	Primary
Feedback surveys from the Pilot's workshops	41	Document provided by key informant	Secondary
Lessons learned document	1	Report provided by the controller of the Pilot	Secondary

Table 2 Interviewees and their positions

<i>Interviewees</i>	<i>n</i>
Management	
Top	2
Middle	3
Front-line	8
Personnel	
Nurses	3
Doctors	2
Other experts	4
All	22

Content analysis, an objective and systematic means of quantifying and describing phenomena (Krippendorff, 2004), was used in this study with a qualitative approach (Eisenhardt, 1989).

All the research data gathered during the Pilot, i.e. verbal, visual and written communication, was analysed (Elo and Kyngäs, 2008). The advantages of content analysis include the ability to manage large volumes of textual data and various textual sources (Elo and Kyngäs, 2008), content-sensitivity (Krippendorff, 2004) and flexibility in adapting to varying research designs (Harwood and Garry, 2003). Content analysis is preferably used in cases where there is little or fragmented knowledge about the subject.

First, a word or word combination describing the factors enabling innovation activities in public hospitals was chosen as the analytical unit directing the analysis. Then the research data was read several times to find deeper associations, models and confrontations (Elo and Kyngäs 2008). After identifying sub-categories by combining synonymous statements in the research material, four generic categories were formed from the sub-categories, leading to formulation of the main category and the key concept about factors enabling innovation activities in a public university hospital (Eisenhardt, 1989). Subcategories and generic categories were given names that depicted them well. The generic categories formed from this research were: *unified practices*, *adequate authorisation*, *supportive culture*, and *expertise in innovation management*. As an example, the formation of one of the main categories, *supportive culture*, is shown in Figure 1.

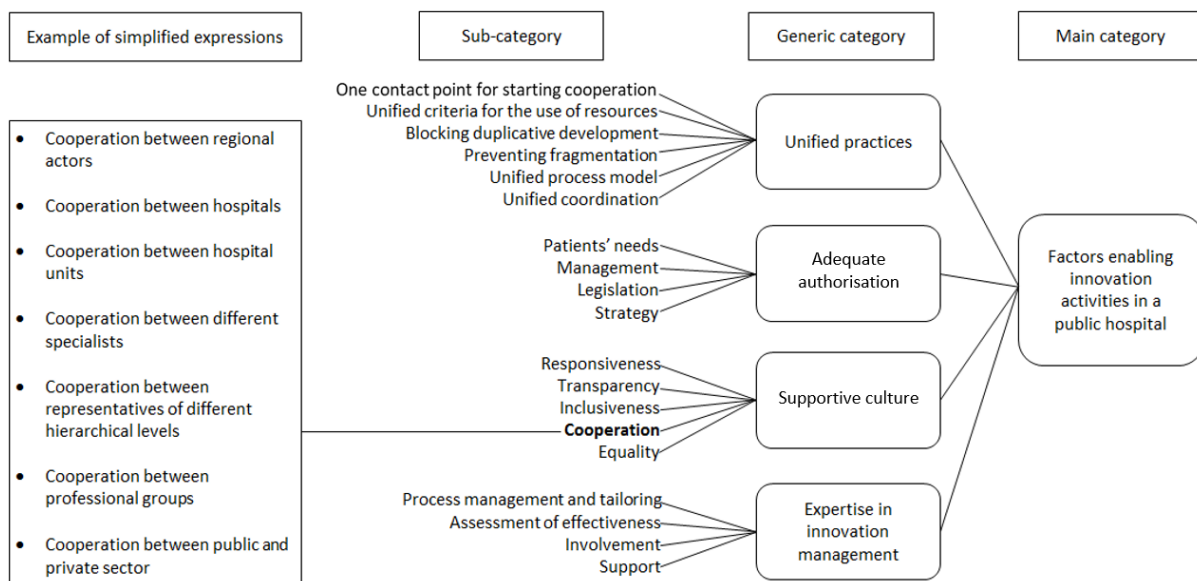


Figure 1 Depiction of the process of analysis and results formation, using the sub-category *cooperation* as an example.

4 The key factors enabling innovation activities in a public university hospital

4.1 Unified practices

Public hospital management and personnel expressed great interest in innovation activities. However, innovation activities were limited by the lack of clear common practices. Innovation processes were initiated and initially persevered, but often stopped due to unclear knowledge-use practices and insufficient coordination and support of innovation activities. Interviewees highlighted the need for introduction of a unified approach to innovation activities in the hospital organisation, as well as effective descriptions and communication of the related

innovation processes. Unified guidelines for resource use were also desired. The following interview statements reflect the views of respondents:

“I think innovation activities should be a standard process for the entire organisation, so that all departments would know that if new things are needed, the development will always be achieved in the same way.” (Public university hospital personnel representative)

“I really hope that this kind of activity will be at the organisational level and will serve all units.” (Public university hospital top manager)

Interviewees also hoped that unified practices would be extended to the requirements for initiating innovation processes and to the criteria used to evaluate them. Respondents described organisationally-common practices that prevent duplicated or fragmented development and that save resources. These practices should be transparently introduced and communicated to the whole organisation and be supported by sufficient coordination and authorisation to enable success. Also, when starting innovation processes, respondents greatly desired one shared, commonly-known point of contact for all stakeholders.

4.2 Authorisation

According to the respondents, to enable internal and external experts to innovate in public hospitals, the hospital management must provide adequate support, such as sufficient resource allocation, for innovation activities. The activities should be comprehensively authorised at all levels of hospital management. Patient needs are the core factor directing management decisions and process authorisation in public hospitals. It is important to identify innovation activities in the organisational strategy to ensure commitment from management and personnel, as reflected in the following statements from the interviews:

“An employee in the field [in a hospital department] will know the necessary development needs in practice; nevertheless upper and middle management will look at the things which are strategically or otherwise suitable for further development.” (Public university hospital personnel representative)

“Many times, employees who have the best core competency in the matter often lack... they feel they can't decide on the matter.” (Public university hospital front-line manager)

Management was considered primarily responsible for hospital innovation activities, and managers were described as mandate givers, evaluators and decision-makers with regard to innovation processes and relevant resource allocation. Time allocation, provision of sufficient tools and an environment for innovation activities were thought to facilitate smooth personnel participation in the activities besides their main duties. When hospital managers were asked to identify the key preconditions for deciding on resource allocation for innovation activities, they highlighted proven relevance based on patient needs and proof of effectiveness. In addition, commonly-approved criteria concerning innovation project initiation and the need for mandatory involvement of adequate expertise were also considered pivotal for estimating resource allocation. Front-line managers in particular were considered crucial for identifying experts within their units for participation in innovation activities. Managers themselves were also considered key experts in strategy-based selection and prioritisation of needs, ideas and solution proposals offered for further development.

According to the respondents, investing in assessment of the effectiveness of innovation activities is critical, as the activities of public organisations are generally regulated and guided by many authorities. Several interviewees reiterated that, in public hospitals, innovation development must always be based on the proven needs of patients, customers and other end-users. In addition, respondents emphasised that activities should be designed and implemented in line with the organisation's strategy as well as the requirements and restrictions set by core hospital actions. When coordinating innovation activities, a thorough understanding of hospital practices is required. Construction of impact assessment practices formed in collaboration with hospital management and the introduction of appropriate documentation and evaluation tools are needed. Nominating authorised individuals to support, promote and evaluate innovation activities is also useful, as these tasks are challenging to implement alongside core hospital activities.

4.3 Supportive culture

Respondents believed that management should focus on building a culture that is supportive of innovation activity. The culture should be grounded on principles like responsiveness, transparency, inclusiveness, cooperativeness and equality. Managers were seen as the most essential actors in the hospital for building a supportive culture for innovation activity. Their positions as managers enable them to build a supportive culture by modelling the culture for personnel and by authorising personnel to operate. Managers themselves highlighted the importance of empowering their personnel to actively participate in innovation activities. They considered it their duty to introduce innovation practices to personnel, and felt it was their responsibility to support efforts relevant to innovation activities to enable success. In addition to hospital managers, inherently-innovative active personnel within hospital units were considered vital promoters of innovative culture. The respondents comprehensively highlighted the need for information-sharing between hospital departments about innovation projects and for encouragement of personnel to innovate. The following excerpts describe the experiences of hospital manager interviewees:

“Our role is to create an atmosphere that is open, so that all ideas are permissible and everyone is listened to.” (Public university hospital middle manager)

“I would definitely encourage people from our department to participate in this [innovation] activity.” (Public university hospital front-line manager)

Personnel respondents stated that coordination of innovation activities should be truly responsive and transparent to enable successful innovation processes. These respondents hoped for regular, open and transparent communication that reached all departments of the organisation and expressed that responses to development proposals submitted by personnel, and communication about these proposals, be provided within a reasonable time. Interviewees also suggested that calls for participation in innovation activities be given with sufficient response time to allow for planning concerning personnel time allocations.

Comprehensive cooperation between various stakeholders was recognised as a core factor enabling innovation activities. Meanwhile, promotion of cooperation was considered a significant challenge in a complex, hierarchical public hospital context comprising multiple functions and specialty areas. Interviewees emphasised the need for equal and comprehensive involvement of experts, despite traditional and, often, resource-allocation-based restrictions, in order to develop innovations simultaneously for all hospital areas in need. Interviewees stated that the involvement of representatives should be objectively assessed on a case-by-case basis:

“--there is a need for a new kind of perspective and new ways of thinking in the hospitals and this [innovation] activity can make them possible by bringing organisations and companies from outside the hospital to collaborate with us.” (Public university hospital middle manager)

“[...] we have probably been so cautious here in public healthcare to work with companies and with other external actors... Even though we are working together, maybe we should do it in a new way. Innovation activities have somehow brought us closer to each other.” (Public university hospital top manager)

The expertise of hospital personnel was highly appreciated, however respondents noted that more versatile knowledge is also needed to successfully enhance innovation processes. Interviewees stated the need for strengthened cooperation between external stakeholders, such as universities, and private companies. Other hospitals could complement and validate the evaluation of presented ideas and proposed solutions, thus supporting appropriate use of public resources. Interviewees from hospital management and personnel stated:

“It’s important that we consult experts comprehensively because sometimes we buy some products for our hospital that do not necessarily serve our operations or communicate with our existing systems.” (Public university hospital front-line manager)

“With the help of practical experts, development can be guided towards the right direction -- it can be a small matter pointed out by a user, which, taken into account, makes it [innovation] more effective, of higher quality and possibly more cost-effective.” (Public university hospital personnel representative)

“The [innovation] process can be much faster when simultaneously bringing experts from different fields in to develop and conduct mid-term evaluations.” (Public university hospital personnel representative)

To improve compatibility between hospital development needs and the solutions provided by private companies, clarification and unification of practices common to both parties are required. This would replace existing practices in which hospital units are searching for ready-made solutions with expectations that their needs will be met. According to the respondents, solution proposals have been purchased from companies as finished products and services. At worst, this has led to hospital process changes to accommodate the recommendations from the proposed solutions. Hospital personnel hoped that, with a supportive culture, the focus would shift to earlier, more comprehensive cooperation between hospital and solution providers. Contributions of end-users who are healthcare professionals should be accounted for at early stages of innovation processes to foster solutions that better match genuine healthcare needs and requirements.

4.4 Expertise in innovation management

Both hospital personnel and management strongly emphasised the need for expertise in innovation management. Innovation management expertise would complement hospital core competencies, including: subject matter expert involvement; tailored, organised innovation

processes; and relevant assessment and reporting of effectiveness. Respondents outlined the need for accredited professionals who would design and control innovation processes on a case-by-case and as-needed basis. Innovation experts would facilitate active communication and cooperation between stakeholders and would also provide adequate information for hospital personnel on the implementation of innovation activities and relevant rules and regulations. Since hospital core activities must always be prioritised, design expertise for agile process customization is also required. The excerpts below from the interviews show the need for complementary innovation expertise:

“Our expertise is not enough in everything. It may seem that ‘this [idea] is great’, but actually there might not be any way to go ahead with it. So there would be a need for such experts in the background.” (Public university hospital middle manager)

“I find it absolutely necessary, that when we notice that something should be developed, there would be someone outside [of the operational departments] with whom... Kind of a supporting function.” (Public university hospital personnel representative)

“As we work through the procurement or the contract side we don’t have the knowhow.” (Public university hospital middle manager)

Interview respondents believed that receiving sufficient support at various stages of the innovation process is critical. Previously, the coordination of development had mainly been the managers’ responsibility, besides their other time-consuming tasks. This often led to few innovation activities occurring, or poorer control of development than the level of control desired by managers themselves. According to respondents, all management levels are indeed engrossed in core hospital responsibilities. Moreover, front-line and middle managers oversee the resources for their specific areas only and, thus, are unauthorized to control overall implementation and resource allocation for innovation activities. On the other hand, top management is highly reserved for managing hospital strategy and are also the most distant management level compared to innovators working in practical operations. Both hospital management and personnel said they rarely had sufficient resources and expertise to independently implement all stages of the innovation process, and they repeatedly expressed the need for assistance from objective, authorised, adequately-resourced innovation experts.

5 Discussion

5.1 Interpretation of findings

Correct actions, tools and roles help enable innovation activities by creating communication bridges and collaboration as well as by counterbalancing and organising the extreme complexity typical of public hospitals. Based on this study, unified innovation activities and effective communication practices should be areas of focus at public hospitals. Innovation activities should be conducted only after they are jointly agreed upon and authorised by all relevant stakeholders, which is contrary to traditional hospital practices for which separate divisions and specialties operate and allocate resources independently. Unification of innovation activities improves when hospital management cooperates in promotion and authorisation of activities that align with hospital strategy (also suggested by, e.g. Luo, 2015;

Duarte et al., 2014; Birken et al., 2012 and McDonald, 2007). The needs identified by end-users and hospital professionals are at the core of authorisation decisions.

According to the study results, innovation activities of public hospitals require the agile and precise involvement of numerous stakeholders (see also Dobrzykowski et al., 2015; Dias and Escoval, 2012; Barnett et al., 2011). This study underlines the need for comprehensive involvement of experts from the very beginning of an innovation process (noted also by Khedhaouria and Jamal, 2015 and Barnett et al., 2011). However, stakeholders must heed the rules and restrictions relevant to the hospital context and should be flexible as healthcare processes must always be prioritised. The innovation activities of a public hospital must be designed to fit into the framework of the core hospital activities and to serve their statutory objectives (suggested also by Duarte et al. 2014; Barnett et al. 2011). Those managing innovation activities must be familiar with specific contextual features and keenly perceptive of the needs of diverse stakeholders. Thus, special sensitivity, cooperativeness, and negotiation skills are required from those who plan, coordinate and lead innovation activities.

This study identifies management support as an important factor that enhances innovation activities (in line with Günzel-Jensen et al., 2018; Demircioglu, 2017; Boscherini et al., 2013; Schultz et al., 2012; Williams, 2011 and Barnett et al., 2011). The study findings reinforce those of Birken et al. (2012) which suggest that the manager's role includes authorising personnel and securing resources as well as modelling appropriate culture. However, this study argues that hospital management on its own cannot be solely responsible for enabling, leading and being subject matter experts of innovation activities. Managers' resources and expertise are not sufficient for executing all stages and forms of innovation management. Hence, hospital personnel as well as management need special support, preferably from outside of hospital functions committed to core hospital tasks, to enable innovation activities.

Authorised innovation experts who are independent of hospital specialties and disassociated from resources assigned to core hospital operations are better able to impartially design, coordinate and organise innovation activities, involve professionals from different stakeholder groups and support cross-functional communication. This suggestion corroborates the study findings of Moreira et al. (2017) and Labitzke et al. (2014). Support for innovation activities may facilitate implementation of the activities throughout the organisation (see Dias and Escoval, 2012) as well as coherent, centralised and objective coordination that empowers personnel from all professions and units. Experts would help the hospital organisation overcome conventional communication and cooperation barriers, mitigate excessive bureaucracy and managerial distance, and ensure easier information flow despite the complexity of the hospital environment. They would promote innovation culture, facilitate innovation processes and support innovation implementation.

Close cooperation between innovation experts and hospital managers at different organisational leadership levels would ensure alignment of innovation activities with hospital strategy and resourcing practices (also Birken et al., 2012) and would also support communication between personnel and management (see Jończyk and Olszewska, 2016). This study highlights the need for appointing accredited innovation experts and for conducting centralised coordination, evaluation and reporting of innovation activities. Public hospitals must demonstrate the effectiveness of their operations (see Labitzke et al., 2014; Duarte et al., 2014 and Barnett et al., 2011) and this requirement seems to conform to traditional evaluation and monitoring practices characteristic of public hospitals (e.g. Jończyk and Olszewska, 2016; Wang, 2015; Labitzke et al., 2014; Bloch and Bugge 2013; Barnett et al., 2011).

Innovation activities include several types of actions and occasions relevant to multiple stakeholders. This study suggests that innovation activity management at public hospitals requires a combination of several management and leadership methods. A suitable combination

ensures effective authorisation, information flow and collaboration on innovation activities, while traditional practices comprise distant and neutral stances towards both internal and external stakeholders (see e.g. Veenswijk, 2005; Kajamaa, 2015; Dias and Escoval, 2013). Contrary to traditional management in the public hospital context, exemplary, instructive, and strongly interactive leadership was considered necessary for enabling innovation activities (in line with Dias and Escoval, 2012). Hospital personnel experienced challenges expressing their opinions to management, leading to hindrance of innovation activities (also noted by Jończyk and Olszewska, 2016). Innovation activities should not be severely restricted but must be facilitated and coordinated. All hospital personnel groups must be able to deftly and equally promote innovation activities.

Emphases on inclusiveness, equality, transparency, responsiveness and cooperation in an organisational culture are vital for enabling innovation activities in public hospitals. These principles align strongly with principles of good governance that are central for all operations at public organisations. A supportive culture, based on these principles, should motivate public hospital personnel to more actively participate in innovation activities. A highly responsive, empowering culture fosters knowledge transfer of innovation processes while simultaneously challenging traditional operational logic and management practices of public hospitals (see also Moreira et al. 2017; Wu and Shieh, 2015; Labitzke et al., 2014).

5.2 Conclusions and future research directions

Core functions of specialized care at public hospitals involve very sophisticated practices, yet comparable investments are not made for developing innovation models that are genuinely, practically and contextually appropriate. Public hospitals must be capable of developing and implementing innovative, value-adding, needs-based solutions to continue meeting the demands placed on them by many. However, both this study and existing research literature identify a clear lack of scientific and practical information related to innovation models and approaches that are appropriate for the public hospital context. Characteristics specific to the public hospital context require carefully tailored innovation activities to ensure their compatibility with the hospital's core operations. Based on the experiences of a diverse group of hospital personnel and management, this study identified several factors that are proposed for consideration when enabling and managing innovation activities in public hospitals.

First, facilitation and management of innovation activities demand that public hospitals critically reflect on their traditional practices and be willing to learn new practices. Ensuring sufficient flow of information and involvement of all stakeholders requires genuine delegation of power and smooth cooperation between all participating stakeholders.

Second, innovation activities must be designed to fit the public hospital environment. Familiarity with the specific characteristics of public hospitals and their objectives, rules and restrictions is necessary, and communication of these to stakeholders involved in innovation activities is important. Due to the complexity of the context and the diversity of stakeholders in public hospitals, innovation activities are encouraged for implementation based on a unified authorised model.

Third, strong control and evidence-based assessment are at the heart of public hospital operations, thus highlighting the requirement to also evaluate the effectiveness of innovation activities. However, interactive, exemplary and instructive leadership styles are often needed for innovation activities. Thus, those managing innovation activities at public hospitals are expected to be capable of agile implementation of different management and leadership approaches.

Finally, both management and personnel need the support of innovation management experts for coordinating, developing and ensuring continuity of innovation activities. This

study suggests that introducing authorised, supporting roles in all hospital operations generates more favourable conditions for continuous innovation and learning in public hospitals.

Due to the challenges experienced in public hospital innovation activities, more attention should be paid in creating, implementing and disseminating of new scientific and practical knowledge. Through the findings of this study, the evidence-based discussion about the factors enabling innovation activities in public hospitals is accelerated and public hospitals are better equipped to promote innovation activities. In addition, through new knowledge, the administration is supported to meet the current, demanding challenges of healthcare.

Further clarification of the roles and responsibilities influencing public hospital innovation activities is needed. Suggested future research questions include: *what qualities and competencies are needed for managing innovation activities in the public hospital context? And, how can the effectiveness of innovation activity in public hospitals be ensured?*

5.3 Reliability and ethics

According to Lincoln and Guba (1985), the assessment of study validity requires evaluation of credibility, transferability, dependability and confirmability of study results. The whole research process of this study was described as accurately and as consistently as possible to facilitate transferability of the results (Graneheim and Lundman, 2004). The credibility of this study is based on reinforcing triangulation, which was achieved by collecting data from multiple sources in collaboration with several researchers and by combining a rich set of data (Erlandson et al., 1993).

Objective research implementation and reporting was conscientiously pursued throughout the research process to ensure study reliability. This was particularly important because the first author of this study participated in the implementation of the case that was investigated. She was the project manager of the Pilot and a designer of innovation activities in the research context, and she interviewed study respondents. However, her position allowed her to profoundly interpret the research data. Thus, to prevent an error due to her position, close attention was paid to the objectivity of the first author's discussions and interpretations. Interview objectivity was also increased by the involvement of several employees of the Pilot in conducting interviews.

Study credibility was demonstrated because the issues raised by the respondents were repeated throughout the research material. Such repetition also reduced the risk of subjective researcher interpretation (Hons and McKenna, 1999). In addition, quoted expressions of interview respondents are presented to support study reliability. The study was conducted in a single hospital, which might affect generalisation of the results. However, the research design meets the objectives of increasing understanding of the phenomenon under study. The results of the study corroborated the results of previous studies well, clearly enhancing the reliability of the study with strong confirmability.

The respondents selected for this study represent a relatively small sample of hospital management and personnel. However, the respondents were appropriately selected as the researchers ensured that each respondent was an expert on the matter being studied, thus increasing data validity. When examining a single hospital for a study, its individual characteristics may be pronounced in the results. However, the theoretical background and the results of the study reflect the public hospital and healthcare contexts such that new information produced by this study could be exploited. Interviews, as a method of collecting information, pose challenges including respondents' inability to provide socially-acceptable answers and the risks of researchers asking leading questions of the respondents, distorting respondents' answers, or possibly misunderstanding the answers given. As needed, the researcher repeated and refined the interview themes identified from the respondents.

This study followed good scientific practices at all stages (TENK, 2013). The research method was scientifically acceptable and suitable for the research set-up. Work done by other researchers was cited with appropriate source references. The researcher also sought and received permission to conduct the study from the Northern Ostrobothnia Hospital District.

Respondents volunteered for this research and signed a written consent form describing the research (Polit and Beck, 2012). They were adequately informed both verbally and with a written cover letter, about the purpose of the study, the research method, processing of the research data and exploitation of the results. The respondents were also informed about their option to stop participating in the research. Participant anonymity was ensured throughout the research process, and the researcher ensured that the research material was properly stored according to good scientific practice. The material was only available to the researcher.

Ethical conduct of the research was also evaluated from the perspective of the research topic. The main requirements, which were comprehensively met by this research, were that the research topic is current and generates benefit to society.

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