

National development program for Finnish hospital facilities

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Reijula K, Hellgren U-M, Holopainen R, Korhonen P, Lappalainen S, Palomäki E, Palonen J, Autio A, Kjisik H, Koski H, Virtanen K, Kaleva H, Rantama M, Vauramo E. National development program for Finnish hospital facilities. *SJWEH Suppl.* 2008;(4):54–57.

To better understand the needs of future hospitals, a nationwide renovation program concerning hospital buildings was recently launched in Finland. Its aims are to develop tools for performing regional long-term plans (including space requirement estimation), to produce criteria for estimating the usability, operability, technical systems, and the basis for physical condition surveys and renovation design, to develop renovation processes for hospital facilities, to develop new tools for property management, to carry out pilot studies with the tools, and to find alternative solutions to owning, financing and managing hospital properties. All these starting points together define the basis for the future spatial needs and operational planning of such premises. The property management and technology of a hospital must be optimized to meet certain requirements, and the planning of renovations must be based on feasibility studies. In addition, increasing attention must be paid to the overall economy and efficiency of owning and managing health care property.

Key terms hospital premise; renovation; long-term planning; property management; space requirements.

The significant changes that have already occurred or will be organized in health care processes increase the need for new actions in hospital facility planning and renovation strategies (1). New clinical methods and equipment, accompanied by complex modern technology, require more flexibility in renovated hospital buildings. The quality of indoor air and hygiene in hospitals is associated with new hazards related to hospital infections and resistant bacteria contaminating the surfaces of the buildings. There is an urgent need also to improve the strategies for renovating hospital buildings.

Finnish health care and hospitalized care are of high quality at the international level. The examination and treatment of patients require a functional, healthy, and safe operating environment. The operations of hospitals are experiencing a major change as the care processes evolve and the focuses of care change, especially due to the ageing population. This process will also create a need to renovate health care property.

An extensive survey funded by the Ministry of Social Affairs and Health concerning needs with respect to indoor air and renovation was carried out in the central hospital network (2). The survey showed a clear need for renovation and modernization in hospital buildings and their air-conditioning systems. A total of 15% of the floor surfaces of the central hospitals were found to require immediate renovation, needing an investment of approximately 400 million euros.

In the future, the operations of hospital districts will be based on the vision of national health care and demographic development in the district. This vision will form the foundation for the allocation and organization of resources. New care methods introduced by the development of medicine must be taken into use. These needs and opportunities will be used as a basis for the creation of care processes for hospitals (1).

All these starting points together define the basis for the future spatial needs and operational planning of the

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premises. The property management and technology of a hospital must be optimized to meet the requirements set by the operations and premises. The planning of the renovation of current property must be based on feasibility studies that take the suitability of the premises for future health care processes into account. As financial resources become even more restricted, increasing attention must be paid to the overall economy and efficiency of owning and managing health care property.

In order to better understand the needs of future hospitals, a nationwide renovation program of hospital buildings is being carried out in Finland. The aims of the project are (i) to develop tools with which to perform regional long-term planning, including space requirement estimation, (ii) to produce criteria for the estimation of usability, operability, technical systems, and the basis for physical condition surveys and renovation design, (iii) to develop renovation processes for hospital facilities, (iv) to develop new tools for property management and carry out pilot studies with the tools, and (v) to find alternative solutions with respect to owning, financing, and managing hospital properties.

Material and methods to be used in the program

The following institutes are participating in the ongoing project: the Finnish Institute of Occupational Health, the Helsinki University of Technology, the Technical Research Center of Finland, and the Institute for Real Estate Economics. Altogether five university hospital districts (Helsinki, Turku, Tampere, Kuopio, and Oulu), three hospital districts (Lahti, Joensuu, Kokkola), and the Helsinki City Health Department are collaborating with 11 partner companies in carrying out the project.

The project consists of six "task groups", which have been launched in four pilot hospitals. In task group 1, regional visions, facility development programs, and master plans have been carried out. This step was performed by reviewing the regional master plans and producing material for regional master planning. In this task group a vision document has also been completed. Task group 2 is focusing on health care processes and facility design and will aim at developing a new method for process-based architectural design. Task group 3 is dealing with guidelines and user requirements. The focus is on HVAC (heating, ventilation, and air conditioning) systems, as well as on indoor air and environmental technology. An analysis of previous literature, knowledge, and experience will be carried out. Task group 4 will assess and survey the quality of the hospital environment. The assessment will focus on operational feasibility, accessibility, and usability. We will analyze the evaluation methods already in use and also the recent

literature. In task group 5, a new management method will be developed for hospital renovation processes. In addition, we will assess how to protect workers and patients during the renovation. Task group 6 will focus on the management of health care property and facilities. A review of current knowledge from the literature and an inventory of the current situation in the participating hospital districts (N=8) will be carried out.

The project is developing renovation methods for health care facilities and analysis processes. It is also creating design instructions and will boost product development in the field. The project, being carried out as a part of the FinnWell technology program of the Finnish Funding Agency for Technology and Innovation (TEKES), consists of seven projects with one common project plan funded by TEKES. Three of these projects are research projects, and four are projects to develop hospital districts. As the project proceeds, practical work has been categorized into work packages that help to achieve the desired results.

Expected results

The following results are expected: (i) methods for combining operational long-term planning and the spatial requirements of a hospital district, (ii) methods for combining the planning and development of care processes in hospital units and spatial planning (solution models for project planning), (iii) a framework for technical planning instructions and user requirements, in particular for renovation, but also applicable to new building work (product development of building, housing engineering, and workstations), (iv) an evaluation model for health care property, (v) a new model for the renovation process of a property, and (vi) operating models for property owning and management.

Long-term operating plans and spatial needs

The objective of the work package dealing with long-term operating plans and spatial needs will be to create methods for combining the operational long-term planning and spatial requirements of a hospital district.

The work package approaches health care and hospitalized care by means of using different sources of information. The vision primarily covers the network of central hospitals in Finland and their changing status. The national and regional planning of health care is now a current issue because it is an integral part of the renovation taking place at the municipality and service structure level. As a result, the status of basic health care services will experience an essential structural change in the near future. The municipality and service structure

renovation will also have an impact on specialized care and the Finnish central hospital network.

The vision has been compiled on the basis of the views expressed by hospital district management, different operators at the central hospital level, and the specialists of the Finnish Ministry of Social Affairs and Health. Information available on international trends will also be put to use. The results and visions of the recently completed future programs will also form a foundation for the vision.

This work package has started with the collection of long-term operating plans in place for the participating hospital districts. The objective is to mirror near-future renovation needs in each hospital district with the long-term operating planning of the said hospital district.

This work package will also include analyses of the hospital districts' own assessments of the situation. At the same time, changes in operations will be forecast, as well as the pressure to change renovation plans and new spatial needs related to the changes in operations.

Property evaluation methods

One objective of the work package dealing with property evaluation methods is to develop evaluation methods for health care property, for example, for operational changes. The result of the evaluation will be a definition of the usability of buildings and facilities that simultaneously takes health care work and the technical restrictions of buildings into account. The evaluation method will also pay attention to financial and architectural aspects.

The property evaluation methods will be developed and tested in a workgroup, which will also define the study methods, and, in some respects, also management tools for the functionality (premises, logistics, suitability, flexibility), usability, and technical condition (structures, indoor air, engineering, expanding opportunities, hygiene) of health care property.

The evaluation method will assess and set criteria for work environment factors in hospitals on the basis of existing regulations and instructions, as well as on the basis of knowledge gained from scientific publications (literature search), interviews, questionnaires, observations, and measurement results. The evaluation of properties will be divided into a rough level to define suitability and a more-detailed level, which will form the basis of the design work.

Planning and renovation processes

Renovation work in a hospital environment sets special requirements both for the operating processes of the hospital in question and for the renovation processes. In addition, the viewpoints and requirements of the

client and many different user groups must be taken into account in the planning and implementation of the renovation.

The objective of this work package will be to create a sufficiently efficient and safe renovation process suitable for the hospital environment. One case example is the renovation work of a hospital ward. First, current processes and their problems and development needs will be examined. Then, improvements will be initiated in the process, and material and instructions supporting the implementation of the renovation work will be compiled. Such material can include planning instructions for the hospital renovation, a risk assessment procedure, a list of methods and equipment for the demolition tasks, dust extraction equipment, and protective equipment. The opportunities of 3–5 dimensional modeling will be separately studied for the planning process. The updated process and material compiled will be tested in a pilot project. The experiences of the project will be used to initiate the required changes in the process and material.

Engineering instructions, technical solutions and bases for product development

The objective of the work package dealing with engineering instructions, technical solutions, and the bases for product development will be to create general engineering instructions for hospital conditions and technical solutions.

Engineering dealing with the air conditioning and thermal environment of health care properties, as well as the setting of target values, will begin with an analysis of the literature. Empirical and epidemiologic evidence on the impact of air conditioning on health and comfort will be searched for. In addition, the need for additional humidity during the winter and harmonization of the thermal needs of the patients and the personnel will be assessed.

Measuring standards and engineering instructions for the housing engineering systems of health care properties have been revised or published around the world during the last few years. The current recommendations will be compared with existing building requirements and hospital practices. Recommended target values for the air conditioning and thermal environment will be set for the most important facilities, such as wards, operating rooms, and emergency and isolation rooms.

The objectives of the work package are also to look for suitable solutions for housing engineering for the cooling of patients' rooms, as well as the distribution and flexibility of the air conditioning. Important targets are also the control of airflow and pressure conditions and ensuring air conditioning in special areas, such as operating and isolation rooms.

The work package will also monitor and report international research in the spreading and control of airborne, commonly dangerous, contagious diseases [SARS (severe acute respiratory syndrome), avian influenza] in health care premises.

Product development opportunities will be assessed together with the enterprises participating in the research.

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