

A new treatment room design model for future hospitals

May 26 2016

In the EVICURES project a design model for future intensive and intermediate care facilities was developed at Seinäjoki Central Hospital. The results of research conducted by VTT Technical Research Centre of Finland Ltd on evidence-based design (EBD) and user-orientation were applied to the design work. The project will be realised when Finland's first single-patient intensive and intermediate care and cardiac unit designed in accordance with the model becomes operational in 2018.

The need for intensive and intermediate care will increase, and hospitals must be developed to meet future needs. "The international trend is that the need for intermediate care in particular is increasing. More and more demanding methods are being used for treating patients, and the share of elderly patients is increasing," says Kari Saarinen, Project Manager of the EVICURES project and Chief Physician at ICU, Hospital District of South Ostrobothnia.

The EVICURES project developed a new design model on the basis of Seinäjoki Central Hospital's needs for intensive and intermediate care facilities using evidence based design (EBD), which is built upon evidence, research results or strong practical experience. An additional goal was to improve the quality and effectiveness of operations, and to increase both patient and staff satisfaction.

There are currently no ICUs with single patient rooms in Finland. Seinäjoki Central Hospital's new intensive and intermediate care unit will feature 24 single patient rooms. "The operations will be more cost-

efficient and of higher quality, when the equipment and nursing staff are concentrated into one place. We also expect the solution to have remarkable effects on patient healing," Saarinen emphasizes.

Nursing staff's experiences and views used as a basis for development work

The hospital staff, management, patients and their families, the hospital district, and other cooperation partners participated in the design work. "VTT produced the technical research data, which was combined with medical knowledge, practices and future visions contributed by the hospital. This enabled transforming theory into practice," Saarinen notes.

When the project was launched in 2014, questionnaires were conducted extensively among hospital staff and patients in order to survey views on such issues as architecture, indoor conditions, durability, functionality, safety, accessibility and usability.

"A user-oriented approach was an essential foundation for the whole project. This way we can all together make the major change about to happen easier, when the nursing staff is moving from facilities for multiple patients to working alone in single rooms," says Tiina Yli-Karhu, Design Coordinator, Hospital District of South Ostrobothnia.

Using the Human Thermal Model tool, VTT performed questionnaire studies and measurements to evaluate the individual thermal sensation and comfort of both the staff and patients. This resulted in setting new limits for ideal temperature. They were used in HVAC design, and the thermal conditions were adjusted to an optimal level with a view to job and patient satisfaction.

Seinäjoki University of Applied Sciences used CAD methods to model a virtual space in accordance with the architectural drawing, which VTT

utilised for improving user-friendliness. From this 3D model, VTT developed a Unity3D game for computer and tablet, allowing the staff to move around in the ICU facilities virtually and to experience realistic interactive care situations in the new working area in advance. This helped in designing suitable facilities that support actual working practices and increase job satisfaction. In addition, the staff became familiar with their future work premises already in the [design](#) phase.

The EVICURES project began in October 2014 and ended in April 2016. It was funded by the Hospital District of South Ostrobothnia, Tekes, Saint-Gobain rakennustuotteet Oy/Ecophon, Granlund Pohjanmaa Oy and the architectural office Jääskeläinen Oy. Participants in the project were VTT, the Hospital District of South Ostrobothnia, Granlund Pohjanmaa Oy, Saint-Gobain rakennustuotteet Oy, the architectural office Jääskeläinen Oy, Seinäjoki University of Applied Sciences, Laurea, Väinö Korpinen Oy, Firstbeat, the University of Tampere, Kainuun sote (the Kainuu Joint Municipal Authority for Social and Health Care), the Southwest Finland Hospital District, Pirkanmaa Hospital District, Vaasa Hospital District, and Chalmers University of Technology, Sweden.

Provided by VTT Technical Research Centre of Finland

Citation: A new treatment room design model for future hospitals (2016, May 26) retrieved 6 May 2024 from <https://medicalxpress.com/news/2016-05-treatment-room-future-hospitals.html>

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