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### ICU Design of the Future: Focus on flexibility

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#### Introduction

Designing an intensive care unit (ICU) to handle the needs of critically ill patients in the future requires both an ability to predict which of today's healthcare trends will still be influential 20 years from now and the flexibility to adapt to these trends. Two current trends that are likely to remain current are: using resources efficiently and meeting the expectations and needs of patients' families.

#### Reorganizing the Resources of the Hospital

The hospital of the future will feature a substantial increase in high-dependency care beds (intensive care, intermediate or step-down/step-up care and intensive monitoring) at the cost of traditional hospital wards. This transition will require maximal flexibility in design.

For the past ten years, designers and hospital representatives in Bern, Switzerland, have been planning the construction of a new facility to house 1,200 of the more than 6,000 workers employed by the University Hospital Bern (Inselspital), a tertiary referral academic medical center and Level 1 trauma center located in the Swiss capital. One of the goals of the building project is to optimize patient care by consolidating related services. In 2010, the hospital's Department of Intensive Care Medicine will move into the new building, where it will be located on the top floor, directly above the operating rooms, the emergency department, and radiology and nuclear medicine, each on their own floor. This layout will enable rapid transportation between the key acute service departments, through dedicated elevators designed for the transport of unstable patients with a maximum amount of medical devices.

#### Optimizing the Resources of the ICU

The ICU of the future will emphasize horizontal, multidisciplinary care and communication processes. The Inselspital's new 3,300-square-meter ICU will also incorporate features designed to improve patient care through efficient use of resources. The ICU itself has been designed to provide flexibility in patient care areas, with several different patient room configuration options, free positioning of the patient bed within the rooms and a logistics concept based on daily replacement of supplies through mobile units with predefined contents, rather than replacement of individual disposables. In addition, recent developments in information technology have been incorporated both at the bedside and in the infrastructure of the building. Wireless communication between patient-specific bedside devices and the clinical information management systems adds flexibility to the bedside design of care areas.

#### Adapting to Meet New Requirements

Not only is flexibility of design elements required, but flexibility in the design process is required, as well. In the ten years since the planning of Bern's new facility began, many aspects of the project have changed. The emphasis has shifted from designing a building and rooms to designing care processes (Regli and Takala 2006).

## **Meeting the Needs of the Family**

One important aspect of future design will be finding a balance between highly efficient care processes and the expectations and needs of patients' families. Already in 1992, the priorities for the design of a new critical care unit at the University of Wisconsin included "patient rooms of sufficient size..." and "a family waiting room to accommodate at least two visitors for each bed" (Hall et al. 1992). Research into the needs of the families of critically ill patients shows that the lack of a comfortable, private space for discussions and conferences is viewed as a serious drawback in an ICU (Heyland 2002).

The needs of families have been taken into account in the design of the new, Inselspital ICU. Thanks to the flexible floor plan, it will be possible to have privacy at the bedside when needed, without compromising patient safety. The unit will include comfortable areas to accommodate families at times when they do not have access to the patient. And finally, the new ICU will incorporate the recommendations of families of deceased patients in a "room of peace" designed to give families a private space to mourn after a patient has died.

## **Conclusion**

Twenty years ago, a hospital in Texas reported on "the development of an intensive care unit that would meet the demands of the future" (Consolvo and Coutts 1984). Although there has been almost no research into the effects of design on ICU care, design is still an issue 20 years later. Whether efficient resource use and family and patient comfort and privacy will remain design issues 20 years from now is uncertain. But the designers of future ICUs can bet on one thing: they can always profit from a measure of flexibility.

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