System Ergonomic Design of Clinical Work Places

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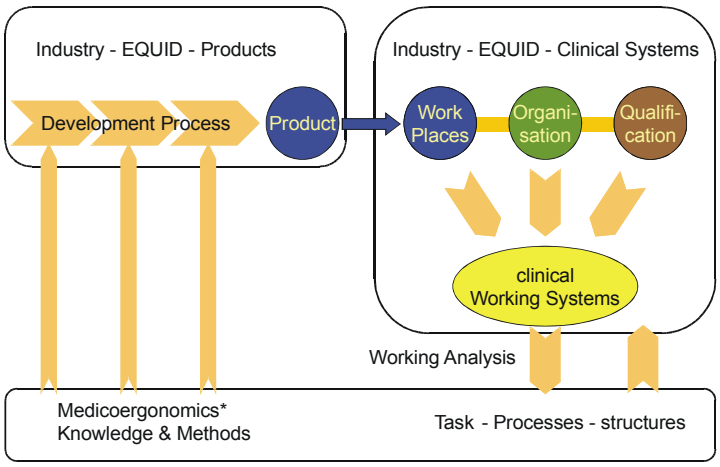
Introduction – Clinical workplaces in Operation Rooms (OR) and Intensive Care Units (ICU) are coined by treatment necessities, technological possibilities, personnel abilities and organisational skills which try to cope with patients individuality and instability. An integral and consistent design of clinical working systems is missed.
According to the definition of the International Ergonomics Association Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimise human well-being and overall system performance [1]. Systems Ergonomics comprises the design of display & control elements, devices, work places, work processes, organisation and entire working systems. The complexity is challenging, but there are encouraging reasons for solving the problems.

Human Error – Physicians and nurses are blamed to cause adverse events and patients harm. An ergonomics assessment proves that the design of devices and work places is poor – human error is pre-programmed. Error prevention has to follow a prioritised TOP-Model: T) Technical prevention (error resistant devices), O) Organisational prevention (e.g. redundant structures), P) Personal prevention.

Quality & Efficiency of Work – Cost cutting in complex systems is dangerous. Mostly sensible quality indicators are missed. Quality problems are detected too late, namely when they are obvious. Based on hierarchical recursive Task-Process-Task-Analyses quality (task completion related to task objective) and efficiency (quality related to used resources) can be defined and monitored in detail [2].

Standards – The IEC 60601-1-6 is entering into force. Its annex AAA addresses topics such as: What could possibly go wrong? *Reasonably foreseeable misuse,* and *Safety* aspects with things like poor labeling, ambiguous controls, difficult to read indicators and uncoded connectors [3]. Usability is stipulated, considering the use and the user. Usability has to become an essential part of the product development process. Ergonomics offer knowledge and methods to fulfil these requirements.

Consequences – The IEA is developing EQUID (Ergonomics Quality in Design), to define process criteria and requirements for the ergonomical design of products, work systems and services. Furthermore it is defining a system for accrediting certifying bodies that will assess the ergonomics quality in design, using the relevant criteria and requirements. EQUID could become a powerful tool to design products and work-systems with the aim of optimising human well-being and overall system performance.



*) defined by Yoel Donchin [4]

References

[1] http://www.iea.cc/; access 17th. Sept. 2006
[2] Carayon, P & Friesdorf, W (2006): Human Factors and Ergonomics in Medicine. In Salvendy G., *Handbook of Human Factors and Ergonomics (p.1517-1537)*, Hoboken: Wiley
[3] Dvorak, P (2004): 60601-1-6 IEC Standard Helps Avoid Designing-By-AccidentStandard. Medical Design
[4] Donchin, Y (2005): Ergonomics in Intensive Care. ESICM congress, Amsterdam