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## VALAMO AND MEDINO - A TOOL AND A DATABASE FOR REPRESENTING USER'S KNOWLEDGE

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**Abstract:** Objective is to support decision making in the layout of a new multidiscipline facility with approx. 25 operating rooms (OR's). Main focus lies on the question whether to work with separate rooms for preparation/induction of the patient or to do these procedures in the OR. Method is an information process by the observation of work procedures and expert-user interviews in the university hospitals in Switzerland (Zurich, Bern, Lausanne), Belgium (Leuven) and USA (MAYO-Medical Center/Rochester). The interviews were carried out with the VALAMO (variable layout model) and the user's statements are structured in a database called MEDINO (management, ergonomics and design information for organisations). In contrast to the Swiss hospitals (6-8 OR's, induction rooms, no central holding areas), the MAYO-Clinic (45 OR's) as well as the hospital in Leuven (16 OR's) have central holding areas, an integrated post anaesthesia care unit. Both hospitals had induction rooms which are no longer in use due to cost constraints. The hospital in Leuven shows an efficient work in small teams (no nurse anaesthetists) and an OR layout which facilitates the organisation.

### Introduction

„Do we need induction rooms?“ - To decide over several architectural layout proposals of a large OR facility, the project team asked for more information. The main question and dispute was, whether:

- to have a central holding area only for patient waiting and separate rooms for induction and preparation of the patient (Concept A)
- or to do some preparations in advance in the holding area and all other procedures in the OR (Concept B).

The idea was to take profit from the knowledge from users which works in one of those OR concepts

Their expertise is related to the system's layout and is based on the organisation of their organisation and daily work procedures. This leads to the underlying difficulty of how to elicit such procedure knowledge, which is mostly implicit, characterised by the fact, that „we can know more than we can tell“ [1].

### Materials and Method

The following sample of hospitals is elected:

1. University Hospital of Bern
2. University Hospital of Zurich
3. University Hospital of Lausanne
4. University Hospital Gasthuisberg in Leuven/Belgium
5. Mayo-Medical Center in Rochester/USA Minnesota

The ergonomist's information process includes: a literature research, a guided site visit, observation of work procedures and semi-structured interviews with over all 32 OR users. All interviews were carried out with the VALAMO (variable layout model), a mobile tool of magnetic objects on a white metal plate, and a small stand for a video camera. The objects fit into an architectural plan, scaled 1:100 as personal and equipment (Figure 1).

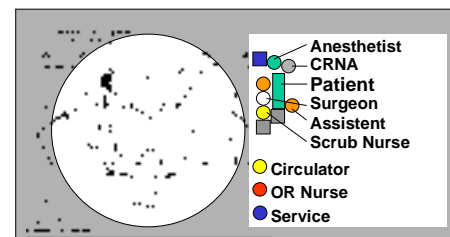


Figure 1: The 1:100 scale of the magnetic objects (right side) is in mean the body space for convenient reach.

All user statements were recorded electronically (video or audio tape), transcribed and structured in a data base. assigned to 19 different aspects:

1. Patient's safety
2. Patient's care
3. Patient's comfort
4. Patient's load of anaesthetic drugs
5. Turn over time
6. Preparation of the OR
7. Organisation of the OR-Staff
8. Team performance
9. Training
10. Ambulant surgery
11. Anesthesia equipment
12. Ratio between the number of OR- and other rooms
13. Holding Area

14. Post Anesthesia Care Unit (PACU)
15. OR's for multiple and parallel surgery
16. Central area for patient's induction
17. Flexible and moveable walls in the OR
18. Combination of concept A and concept B
19. Other concepts, ideas

For each aspect (1-19), core statements were summarised and linked to the original user's statement.

## Results

The literature review shows only few publications. Some propose to install preparation and induction rooms in a separate and friendly area beside of the OR facility [2]. Others want to divide the OR in two rooms for simultaneously patient preparation and surgery [3].

The interview resulted in 580 statements from all 32 users (Anaesthetists, Surgeons, Nurse Anaesthetists, OR-Nurses, Specialists) in the five hospitals. The hospital's OR concepts are:

1. Bern (1964): A, but no holding area
2. Zurich (1990): A, but no holding area
3. Lausanne (1980): B, no holding area/planned as A
4. Leuven (1985): B, but planned as A
5. MAYO (1981): B, but partly planned as A

Due to the restrictions in size of this paper, a selection of results/aspects can only be presented briefly:

*Patient's safety* - No problems (hygiene, infections) were mentioned in both concepts.

*Patient's care* - the constant relation between one and the same anaesthetist and the patient is of great importance. Due to personal costs constraints, in the hospital in Leuven such a relation can't be realised.

*Patient's comfort* - The users in concept A proclaimed the noise in the OR as a stress for the patient, in practice the users of concept B try to reduce all noise until the patient's intubation is over.

*Turn over time* - the extubation is a uncertainly time factor and can block the OR. In concept B separate rooms for regional anesthesia are required.

*Preparation of the OR* - Swiss hospitals (Zurich, Bern) lose time because they don't allow entering the room until the set-up of the instruments are finished.

*Organisation of the OR-Staff* - personal cost can be reduced by team work structures, as demonstrated in Leuven (no nurse anaesthetists) and by supervision, which requires an adequate layout of the OR facility.

*Ambulant surgery*: - ambulant surgery causes problems in scheduling of the surgical procedures, more and more OR's are blocked by walk in patients in the morning hour (hospital in Leuven). Separate patient holding areas were designed (MAYO).

*Ratio between the number of OR - and other rooms* - when using concept B, 25% more OR's are necessary to manage the same amount of surgical procedure in the same time as in concept A.

*Holding Area* - Problems to guarantee the patient's privacy were mentioned (Leuven, MAYO). Advantageously the holding area can be combined but must be separated flexibly with the PACU.

*Post Anesthesia Care Unit (PACU)* - A bottle-neck (The hospital in Leuven must enlarge their PACU), requires separation according to the patients (children, ambulant/stationary). The PACU is used in the morning as holding area (MAYO).

## Discussion and Conclusion

System's design is more and more done in a cooperative approach together with the users of the concerned system, to let them participate with their knowledge. The intention is to reach user acceptance and best performances of the new system. But:

1. Knowledge verbalisation is a difficult process [1],
2. The users often can't anticipate future situations.

As demonstrated in this study, aspect (2) can first be solved by user interviews in similarly systems which already exist. But then aspect (1) is still of great importance and a particular technique like the use of the VALAMO is needed to support the verbalisation of experiences and knowledge. This can provide the design decision makers with valuable information, but:

1. This information has to reach not only the decision makers but also the designer in an early planning stage.
2. This information must be visualised for to be understood by the users of the planned system.

The first is often avoided due to time and cost constraints, the latter leads often to misunderstandings, fears and lack of acceptance. Concepts are necessary to gather and provide customised information efficiently. As one of the important customers is the user and his work procedure, the discipline of Ergonomics can be the disseminator in such information handling processes [4].

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