

Participatory ergonomics in health care. Methods to implement changes deriving from a broad statistical analysis (the European Nurses' early exit study)

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TOPICS

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1. INTRODUCTION

The technical implementation plan, a conclusion from the NEXT study (10 participating countries, 39,898 healthcare workers (HCWs)), highlighted that, in order to prevent leaving them from profession prematurely, it is important to expand nurses' expertise, to improve working processes through multidisciplinary teamwork, and to develop ward designs to facilitate teamwork. The study's outcomes imply that the physical and emotional burdens of nurses require team discussions. Previous research has also indicated that serious problems in work design and workforce management threaten the provision of adequate healthcare. Much more understanding is needed regarding strategies that might positively impact nurses' work environment.

2. METHODOLOGY

In the first part of this analysis, we compared seven hospitals' projects to understand how they facilitated team building to improve the quality of care and to reduce adverse events. In the second part, we used an action research model, aimed at managing change with active participation by all members, to contribute to the development and implementation of change. This action research model was based on the transfer of ergonomic knowledge to nurses, nursing aids and head nurses in order to co-elaborate necessary changes, involving HCWs and ergonomists in

two university hospitals. Continuous observations of whole work-posts, by different occupational categories at different work schedules, were made by ergonomists and by trained HCWs. Quality of teamwork and information sharing was studied, as was time spent in different rooms, activities undertaken, interruptions, verbal exchanges and work postures. Space analysis was also used to understand the influence of space constraints on the way activities were accomplished.

3. RESULTS

3.1 Comparison of seven hospitals' projects

During the International Congress "The Third Millennium Hospital" (Alba, Italy, May 17-19 2006), seven hospitals' projects from six countries were presented.

The design of these projects clearly did not pay enough attention to the objectives of providing an error-free work space and organisation.

It becomes indispensable to design space for preparing and organizing care in order to reduce the risk of error by limiting co-activities, interruptions, interference and noise, while improving the circulation of information about a group of patients.

For example, 47 avoidable events arising during care, and for which an error was identified, were the consequence of: errors made carrying out the care (23), erroneous indications (9) and delays carrying out the care (15).

The care support zone, thus, must meet two different requirements: 1) sufficient surface area for two different teams to prepare care (corresponding to two different sectors or groups of patients' rooms), and 2) the possibility to share space when only one team is present.

The seven hospitals' projects presented during the Congress had wards for 24 to 42 patients. But only two projects had more than

one administrative zone for two different nurses to organize, discuss and tape data pertaining to a sector of half of the patients and to allow for shift handover between the nurses of each sector. Furthermore, nurses often work with a nursing aid and have to elaborate a care plan adapted to each patient with the physician. So a multidisciplinary team has to be able to meet for each sector to share information. But the space does not seem to be suitable for this information sharing in five out of seven projects. The surface area is only once more than 20m²; once, it was only 10m². Only one space has natural lighting. Only three allow for confidential discussions with the possibility of closing a door, all the other are open with a desk.

For preparation of technical care, three out of six projects describe only one room for the two or three nurses' sectors. The surface area of this space is only once more than 20m² and in one it is only 12m². Only three have natural lighting. All projects but one devote less than 0.5m²/bed to this space.

The distance between the support zone and the last patients' room is greater than 30 meters in three projects.

Only two projects allow nurses in the support zone to see the entrance to the ward, which may cause safety problems.

3.2 The action research model

Rigorous, continuous observations of nurses' work were conducted by ergonomists covering the totality of the work period. After the teaching session, nurses and nursing aids also observed a colleague in order to obtain sufficient data to analyze the real use of space and the risks of making errors due to systemic malfunctions.

3.2.1 Work in the nurse office and the corridor

Using inadequate software to organize and register care for six to eight patients increases the time spent in the administrative part of the nursing zone. In the different observations, the time spent in this zone was between 18 and 25% of the work period (see Figures 1 and 2). The time spent in the corridor going to patients' rooms and preparing technical care or entering data into a computer on a trolley was between 5.8% (only at night) and 18.6% of the work period.

This repartition was observed in each department where the study was conducted (table 1). The percentage of time in patients' rooms was never greater than 32%. And the number of entrances into patients' rooms, 4 times greater than 60, was not compatible with a hand wash before and after each entrance.

In four observations, the percentage of time spent in the nurses' office was greater than 15%, with 19 to 48 entrances. And in all cases, the percentage of time spent in the nurses' station was higher than 12%, with always more than 25 entrances. At night, in oncology where medical charts were not computerized, nurses wrote in the medical charts in the rest-room, more comfortable than the office. But administrative tasks remained time consuming.

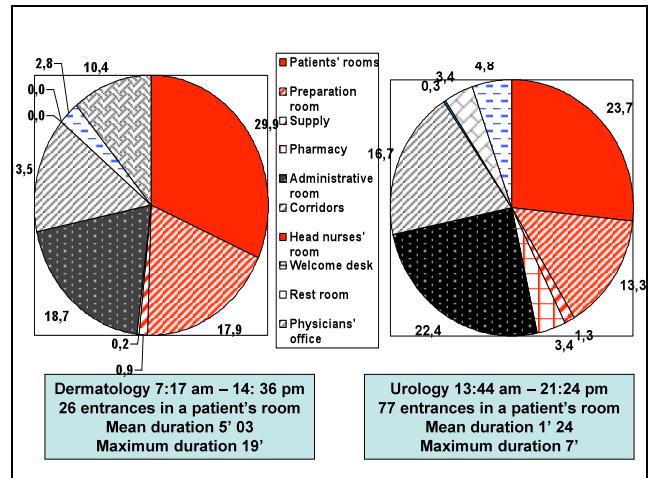


Figure 1. Percentage of time spent by nurses at each location during the total work period, observed in a university hospital in 2007.

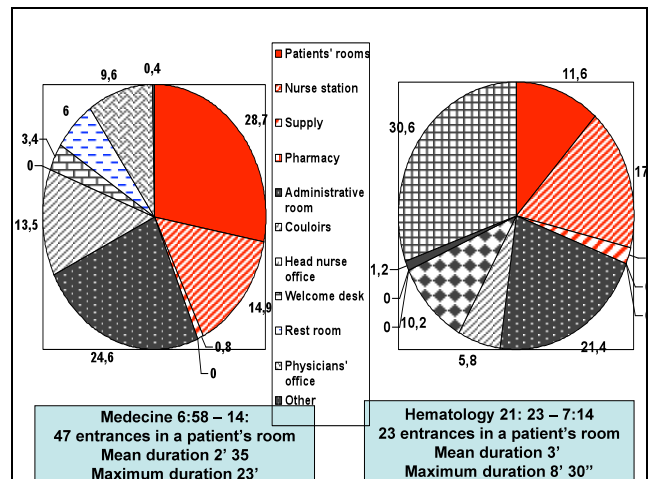


Figure 2. Percentage of time spent by nurses at each location during the total work period, observed in a university hospital in 2007.

Table 1. Repartition of the time spent by nurses at each location, observed in a university hospital in 2007

	Med.	Urology		Dermatolog.		Hema	Onco
Work schedules	am	am	pm	am	pm	Night	Night
% time in patients' rooms	31.8	27.9	23.7	29.9	31.6	11.6	30.7
Nb. of times going into patients' room	62	67	73	26	47	39	80
% time in corridors	23.6	16.3	16.7	13.5	11.8	5.6	10.9
Nb. of stays for work in the corridor	46	39	82	51	93	77	95
% time in nurses' office	9.7	8.8	22.4	18.9	15.2	31.8	4.4
Nb. of times going into nurses' office	19	21	31	19	22	48	7
% time in nurses' station	13.8	15.4	13.3	17.9	27.2	17.2	12.0
Nb. of times going into nurses' station	27	37	43	26	57	47	38

3.2.2 Concomitant conversations

The need to prepare care in the nurses' station and to use computers in the nurses' office is frequently simultaneous for the

different nurses taking care of different groups (sectors) of patients (figure 3). They risk errors due to mixing preparations on the same work top as other nurses, or from hearing one treatment discussed by another nurse and physician while they are preparing another. When in the office, they risk writing that the treatment was given when this is not the case, as they are frequently distracted by numerous colleagues in their surroundings.

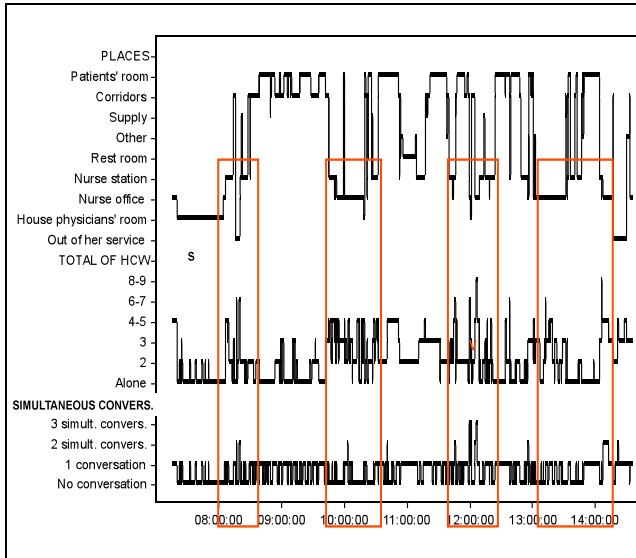


Figure 3. Time spent by a nurse in the nurses' station and office, number of HCWs simultaneously present and number of simultaneous conversations, in a university hospital in 2007.

3.2.3 Interruptions

This organization does not provide adequate space for all those who care for the same patients to share information (figure 5).

This distribution was observed in each department where the study was conducted (table 2). The duration of shift handover at the beginning of the work period lasted less than five minutes in three observations and was never more than 18 minutes. In most of cases, all patients from the different sectors were presented briefly. The duration of shift handover at the end of the work period lasted less than 10 minutes in four observations and never more than 21 minutes. Also, in most of cases all patients from the different sectors were presented briefly.

One of the consequences is a high number of interruptions-- over 40 in five out of seven observations.

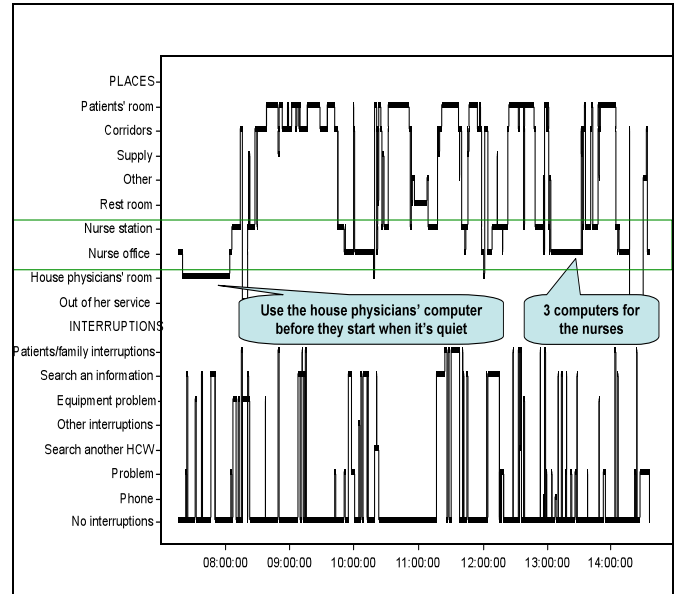


Figure 4. Time spent by a nurse in the nurses' station and office, and work interruptions, in a university hospital in 2007.

Table 2. Time devoted to oral shift handovers and subsequent work interruptions observed in a university hospital, in 2007

	Med.		Urology		Dermatolog.		Hema	Onco
Work schedule	am	am	pm	am	pm	am	am	
Duration of shift handover at the beginning of the work post	17'30	17'	2'45	0	11	16'15	4'15	
Duration of shift handover at the end of the work post	21'	13'	6'25	9'	13	9'55	4'15	
% of time spent in interruptions	14.1	9.1	2.7	24.1	6.7	5.8	29.6	
Nb. of interruptions	63	65	10	70	25	43	73	

3.2.4 Observations made by HCWs following the research action session

In each ward HCWs of different qualifications observed the work of another colleague of a different qualification.

They found that other qualifications also spent an excessive amount of time in preparation and administrative work, away from patients' rooms (table 3).

Table 3. Distribution of the time spent by nurses at each location, observed by their colleagues during a participative ergonomic session

	House physician	Nurse	Nurse	Nurse	Nurse	Nurse
Department	Dermato.	Dermato.	Dermato.	Hemato.	Hemato.	Oncology.
Work schedules	8:50 - 19:30	7:30 - 15:15	13:37 - 21:30	7:00 - 15:00	6:50 - 14:40	21:30 - 6:30
% time in patients rooms	32.4	26.2	32.3	24.6	27.4	40.4
Nb. of times going into patients' room	25	37	36	24	15	37
% time in corridors	19.7	1.7	7.4	6.5	3.4	2.8
Nb. of stays for work in the corridor	32	7	19	24	11	12
% time in nurses' office	1.7 (Physic. office 27.5)	21.9	23	18.5	23.6	44.3
Nb. of times going in to nurses' office	6 (Physic. office 23)	34	21	26	29	12
% time in nurses' station	0	26.9	20.9	27.5	30.4	12
Nb. of times going in to nurses' station	0	44	29	52	29	24

They also found an excessive number of interruptions for each colleague of another qualification (table 4).

Table 4. Time devoted to oral shift handovers observed by their colleagues during a participative ergonomic session

	Nurse	Nurse	Nurse	Nurse	Nurse
Department	Dermato.	Dermato.	Hemato.	Hemato.	Oncology.
Work schedule	7:30 - 15:15	13:37 - 21:30	7:00 - 15:00	6:50 - 14:40	21:30 - 6:30
Duration of shift handover at the beginning of the work post	0	10'	6'	20'	41'
Duration of shift handover at the end of the work post	2'	14'	6'	23'	0

4. CONCLUSION

The presentation of the different observations made in each department helped the different members of these departments to understand systemic difficulties and thus avoid blaming another professional group for them. The collective analysis was

conducted in order to find a better work organization and suitable space (dimensions of each room, proximities and circuits).

This process favours mutual recognition and leads to team building. The aim was to create a system of care delivery which would allow for safer care. Another aim was to reduce burnout among HCWs.

It was possible and of utmost importance to design space for preparing and organizing care safely while allowing administrative and technical tasks to be accomplished. But this required the fulfilment of the conditions found in the ergonomic analyses.

The division of the service into sectors must be up to date and complete. This division into sectors requires several conditions:

- The design of the care preparation area must be based on the regrouping of the rooms into sectors. This does not require, inevitably, creating two separate spaces; however, the dimensions of the care preparation area must allow for two persons to prepare on two separated worktops so as to avoid errors and jostling. This requires adequate space. A surface area which does not fall below 0.60 m² / bed appears the most adequate.
- The distance between the care preparation area and the last room should not exceed 20 meters. The radial structure and the structure with a double corridor allow reaching this objective, if these structures lean on an organization where rooms are grouped in sectors.
- The administrative and transmission space has to be separated from the care preparation area, while still allowing both sectors to be combined when the work force is reduced.

The quality of the working space also depends on several points.

- The presence of natural light must be assured. It will not inevitably be due to the natural lighting of the administrative post. A good study of the adjacent space can provide the work space with natural illumination.
- The arrangement of satellite posts reduces interruptions, simplifies the preparation of care, respects hygiene rules and reduces distances walked
- The entrance to the preparation zone does not have to be through the administrative zone since exiting with trays and trolleys is a risk factor for accidents.

The confidentiality of the discussions must be protected while allowing for safety and surveillance.

To assure the confidentiality two points are necessary:

- A closed zone near the administrative zone has to allow for discussions without being heard in the corridor. It has to allow four to six persons from the same sector to sit together and discuss.
- The surface area of the administrative zone has to allow two persons from each sector to work while sitting.

The location of the administrative post must allow for safety and surveillance:

- The administrative post has to be situated near the entrance of the service to perform its role of reception and to reduce interruptions due to visitors to the service.
- The entrance to the service does not inevitably have to be located at an extremity. A central arrival in a mono-space corridor or at the head of a radial structure may be suitable.

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