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**About DESIGN DILEMMAS**

Fall 2010's Design Dilemmas are a series of reports that explore the numerous issues involved in the design and function of medical-surgical units. They are put together by students in DEA 4530 Planning and Managing the Workplace (Cornell University). DEA 4530 applies systems-thinking and evidence-based design to the planning and design of healthcare facilities. The class takes a close look at the complexity and interconnectedness of issues in a hospital, such as layout, models of patient care, organizational culture, and technology, and how these issues influence effective healthcare delivery. Opportunities for innovation are highlighted.
This Design Dilemma looks at the nurses’ stations in a hospital’s medical-surgical unit. Nurses’ stations are traditionally hubs of activity where nurses gather to work individually, collaborate, and socialize. However, they can also be busy, noisy places that are distracting and unfavorable for work. Current solutions to the traditional centralized station are to break up the nurses’ stations into small substations, either completely to create decentralized stations, or partially to create a hybrid form. Since hospitals are such multifaceted and dynamic workplaces, no one solution has proven effective for ensuring high job satisfaction, efficient work processes, safe environments, and/or positive patient outcomes.

Research on nurses and nurses’ station consistently shows a strong connection among organizational culture, physical environment, patient outcomes, and nurses’ job satisfaction. Changing the culture or environment will invariably affect the other factors, and each configuration for nurses’ stations have strengths, weaknesses, and tradeoffs related to these issues.

Journal articles, ethnographic studies, healthcare magazines, white papers, and newspaper articles were used to cull information about nursing culture and develop recommendations / possible innovations for re-designing nurses’ stations.

Interaction among physical design, organizational culture, work processes, and technology. Adapted from Hendrich & Chow, 2008.
EXECUTIVE SUMMARY

Highlights from the research

Nurses are as a whole overworked, stressed, and at risk of leaving their jobs.

Nurses spend more time on documentation than they do on patient care, even though patient care is more important. Nurses spend the most time and do the majority of their work at nurses’ stations.

Communication is a key issue. Interdisciplinary care is on the rise, but anecdotal and ethnographic evidence indicate that nurse-physician relationships are often strained.

The use of technology is changing the way caregivers and patients communicate. Theoretically, it should make work easier. But because of a lack of software consistency and training, technology can make work more difficult.

Nurses’ job satisfaction cannot be overlooked. It is linked to workplace culture and patient outcomes.

Understanding and respecting nurses’ work values goes a long way.

The physical environment alone is not the most important issue. It must be developed in conjunction with a healthcare environment that supports the cultures of its workers and promotes understanding across disciplines, as culture is a significant contributor to nurse job satisfaction and patient outcomes. Nurses are resilient to slight inconveniences in the environment; they can and do adapt.

Recommendations

Use a hybrid model that combines a centralized station with distributed nurses’ stations.

Nurses’ stations should have visibility of patients and of circulation paths.

Medication and supply rooms should have visibility of patient rooms.

A nurses’ station must be located near the unit entrance.

Support social interaction at nurses’ stations (while minimizing noise and distractions).

Increase flexibility of spaces so that nurses can work at stations or in patient rooms.

Increase the prominence of nurses and/or their work in meeting spaces.

Provide different types of workspaces to support varying levels of immersion.

Project approach

In order to design nurses’ stations that work, we must first understand the people who use the stations and the work that they do.

Who are the stakeholders? What is the organizational culture? Does this culture support patient-centered care, safety, positive patient and family experiences, and job satisfaction? What is the interplay among these outcomes, culture, and the physical environment?

How nurses’ stations are designed and arranged within a unit can then be evaluated against the functional requirements of a medical-surgical unit and the psychological and social needs of its workers.
Who are the stakeholders?

Nurses
Nurses are the primary workers in the medical-surgical unit. They occupy the unit 24/7. Their responsibilities are vast, and include direct patient care (such as monitoring vitals and bathing), indirect patient care (such as ordering medication, documentation, and cleaning rooms), unit work (such as answering phones and directing visitors), and non-clinical work (such as communicating with family). Though not all of the nurses’ work is done at nurses’ stations, they consider the stations their home bases.

Patients
In patient-centered care, patients and their caretakers (family, friends) play a role in care, and communication and positive relationships with hospital caregivers are important. Patient-centered care also considers the culture and values of the patient when making care decisions. While patients do not use nurses’ stations, the environment can support or curtail nurses’ abilities to do work and nurse-patient relationships.

Physicians
Physicians meet and communicate with nurses at nurses’ stations and in other staff spaces. They also use the space and computers in nurses’ stations to do work such as documentation, dictation, and reviewing patient records. Though nurses’ stations are not officially physicians’ primary workspaces, much of their documentation and patient-related work is done on the unit.

Allied health professionals
Allied health professionals include roles such as dietitians, physical therapists, social workers, and chaplains. They are usually in the unit to collaborate with nurses and/or physicians on patient care plans and to provide care. They may use the nurses’ stations to work. Their presence in the unit is dictated by patient needs, whereas nurses and physicians are regularly in the unit.

Visitors + Family members
Family members often discuss patient cases with nurses and physicians at nurses’ stations. Visitors & family also use nurses’ stations to sign in, inquire for information, use the phone, and fill out forms. Their use of nurses’ stations is limited to counters/ the periphery.

Hospital administration
The design of the nurses’ stations may affect the organizational image that the administration wishes to project. Different unit and nurses’ stations designs also have cost and maintenance tradeoffs.
**What is the organizational culture?**

Organizational culture refers to the ways in which individuals in an organization interact with one another, as well as to the norms and expectations of behavior. Different cultures manifest different forms of, for example, organizational structuring, physical environment, networking patterns, communication styles, and responsibilities. These in turn affect and are influenced by the chosen model of patient care, which in turn affects what kinds of work people do and how they do it. Traditional models of care, in which physicians have the most authority, are increasingly being replaced by patient-centered models of care, which emphasize patient needs and safety, and, as a corollary, interdisciplinary care.

**a. Traditional model of care—strong hierarchy**

**b. Shared decision-making**

**c. Patient-centered care model—interdisciplinary collaboration**

Organizational structure affects working and communication styles.
PROJECT SCOPE

This report focuses on the work of nurses, because they are the primary caretakers in medical-surgical units and the primary users of nurses’ stations. Since hospitals are ultimately about patient care, this report also looks at how nurses’ work affects patient care, safety, and outcomes, and the factors that affect nurses’ work (such as the physical environment and organizational culture). Solutions to improve nurses’ quality

Roadmap
Trends in nursing
About nurses + their work
Pertinent issues for nurses
Current solutions for nurses’ station design
Recommendations

“Inefficient work processes and physical designs, gaps in technology infrastructure, and unsupportive organizational cultures contribute to inefficiencies and stress for hospital nurses, limiting the time they spend in direct patient care.”

Hendrich & Chow, 2008, p. 1

Findings
(Hendrich, Chow, Skierczynski, & Lu, 2008; Knoll, 2010; Laschinger, Wong, McMahon, & Kaufmann, 1999; Rochefort & Clarke, 2010)

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<tr>
<th>Organizational culture + work processes</th>
<th>Nurse outcomes</th>
<th>Patient care</th>
<th>Patient outcomes</th>
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<tr>
<td>Strong nurse-physician relationship, communication</td>
<td>Low stress</td>
<td>High quality of care</td>
<td>Positive patient outcomes</td>
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<td>Autonomy</td>
<td>Low burnout</td>
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<td>Adequate staffing</td>
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<td>Efficient work processes</td>
<td>Job satisfaction</td>
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<td>Shared decision-making</td>
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<td>Support + recognition from administration</td>
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Inadequate staffing, long shifts (8–12 hours), lack of support from administration, increasing standards of care, and increasing demands from patients and family are leading to high stress, burnout, turnover, and job dissatisfaction among nurses.

**Aging nurse workforce**
- Median age of RNs in 2008 was 46 (HRSA, 2010), and the average age in 2009 was 46.8 (HRSA, in Miovski, 2009)
- 10.7% of working RNs are 60+ years old & 10.6% are younger than 30 (HRSA, 2010)

**High workload**
- For the day shift in a medical-surgical unit, the average nurse : patient ratio is 1:6, but it can range from 1:3 to 1:12. 23% of hospitals had a ratio of 1:7 to 1:12. At night, the average is 1:7, but 34% had a ratio of 1:8–1:12 (Cavouras and Suby, 2003)
- Higher staff : patient ratio is linked to higher mortality (Hendrich & Chow, 2008)
- In California, the required nurse : patient ratio will be 1:5 (Flynn, 2005)
- The growing + aging U.S. population will increase demands on healthcare (Hendrich & Chow, 2008)

**High turnover**
- Turnover rate in the U.S. is 20% (New York Academy of Medicine [NYAM], 2003)
- Costs $42,000 to replace a medical-surgical nurse (The Advisory Board Company, 2001)

**Nursing shortage**
- Shortage of 275,000 nurses by 2010 (NYAM, 2003), and 340,000–1,000,000 by 2010 (Anderson, 2007)

**Increasing number of short-term nurses**
- As a result of nursing shortage
- In 2000, short-term staff only totalled 2% of working nurse population, but this is a 65.5% increase over 1996 (Spratley, Johnson, Sochalski, Fritz, & Spencer, 2000, in Page, 2004)
- In a 2001 survey of 693 acute care facilities, 54% of vacancies were filled by temporary nurses (The HSM Group, 2002)

**More males**
- Majority of nurses are female, but number of male nurses is rising (Page, 2004)
- 6.2% of RNs licensed before 2000 were male
- 9.6% of RNs licensed 2000 and after were male (U.S. Department of Health & Human Resources, Health Resources and Services Administration [HRSA], 2010).
WHAT ARE THE IMPLICATIONS OF THESE TRENDS?

Aging workforce
The physical design of the unit can stress or accommodate the abilities of aging nurses—what physical tasks can they perform safely, and/or how can they be made more safe? Boulanger observes that walking long distances in a unit is a concern for older nurses (in Health Facilities Management [HFM], 2006).

High turnover
Careful attention must be paid to factors that positively affect nurse retention and job satisfaction. While there have been no studies on the direct effects of physical design on job satisfaction, one can look at degree to which the social environment supports nurses in doing their work how they want to do it. For nurses, autonomy, shared decision-making, and positive feedback and approval from leaders all contribute to higher perceived control and as a result, job satisfaction (Laschinger et al., 1999). Therefore, a work environment that gives nurses opportunities and recognizes them for their work is more conducive to job satisfaction. Higher job satisfaction, in turn, increases quality of patient care and patient outcomes.

Increasing short-term staff
The hiring and training of temporary staff can affect the physical design of the workplace, and have implications for work processes and organizational culture. For example, medication systems and organization of spaces may have to be more ‘intuitive’ to use. Training existing incoming staff on effective communication skills will also be necessary for maintaining high standards of collaboration and patient care.

Different types of medical nurses:
- Nurse practitioner
- Registered nurse (RN)
- Licensed practical nurse (LPN)
- Certified Nurse Assistant (Nurse Aide)

More training & education
Technology

There is an increasing use of technology in hospitals, especially with respect to documentation and electronic health records (EHRs). Implementing technical systems in a hospital unit changes the physical requirements of its spaces (for example, less or no room is required for paper files), and changes the nature of interactions among nurses, physicians, and patients (for example, the ability to collaborate while in separate spaces).

Nursing stations are becoming “data centers” (centralized) and “docking stations” (decentralized) (Flynn, 2005).

There is more mobile equipment, such as ‘computers on wheels’ (COWs).

Even though technology has the potential to reduce the amount of work that nurses have to do (such as documentation), it is not effective as it could be because:
• Many records are still paper-based;
• Systems of records are incompatible, so information has to be entered multiple times;
• Originally digital information, such as patient monitor readings, cannot be input directly into EHRs, and thus have to be transcribed;
• Electronic systems were not designed with users in mind and so do not meet the nurses’ needs, in terms of work process or user needs (such as ability to learn the software) (Robert Wood Johnson Foundation, 2010)

WHAT ARE THE IMPLICATIONS OF THE INCREASED USE OF TECHNOLOGY?

More mobile and hand-held equipment increases the possible spaces that nurses can work (Flynn, 2005) and allows for more information exchange at the patient’s bedside (Keenan, in HFM, 2006). This can change the locations at which nurses perform different tasks; for example, there may be fewer family and patient meetings at nurses’ stations, because they can take place at the patient’s bedside, which decreases the need for acoustic privacy at nurses’ stations.

Mark, Salyer, and Harless (2002) found that the number of beds and use of technology in a unit affect nurses’ perceptions of staffing adequacy, which affect job satisfaction. These findings suggest that nurse : patient ratio can be ‘high,’ as long as the absolute number of patients per unit is low. Nurses should also be adequately trained to use the technology in a unit, so that they are not overwhelmed.
What nurses do

Nurses are responsible for an extensive range of jobs. A study by Hendrich, Chow, Skierczynski, and Lu (2008) of medical-surgical nurses in 36 units found that this is how they spent their time:

**Nursing-related activities—77.7% of time**
Patient assessment, patient-care activities (such as bathing patients and cleaning patient rooms), documentation, medication administration, care coordination (communication with other staff about patients, rounds, meetings)

Documentation, medicine administration, and care coordination take up half the day.

Documentation is often a reason for working overtime “unofficially” (Trossman, 2001). What kinds of documentation do nurses do? “[P]atient care plans, progress notes, flow charts, and shift-to-shift documentation or reports; medication administration and treatment records; patient education; admission, discharge, and transfer notes; justification for use of restraints; and patient classification systems” (Page, 2004, p. 245).

**Non-clinical activities—12.6% of time**
Personal time, patient & family care, administration, teaching, communication with visitors

**Unit-related activities—2.8% of time**
Preparing equipment, counting supplies & medication, transporting patients, phoning, faxing, copying

**Wasted time—6.6% of time**
Waiting, looking for, retrieving, delivering things
**WHAT ARE THE IMPLICATIONS OF THESE FINDINGS?**

With the numerous responsibilities that nurses have, how can the environment reduce the stress that they feel and make work more efficient and effective? Bromberg (2006) suggests reducing the “cognitive load” of nurses—having the information that nurses need when and where they need it. She highlights three levels of information: long-term, changing, and emergency information.

More nursing time with patients leads to better patient outcomes (Hendrich et al., 2008). However, nurses only spend 15% of their time in patient-related activities, while they spend 40% of their time on documentation and communication. How can design increase patient-nurse interaction?

“...A picture emerges of the professional nurse who is constantly moving from patient room to room, nurse station to supply closet and back to room, spending a minority of time on patient care activities and a greater amount of time on documentation, coordination of care, medication administration, and movement around the unit.”

Hendrich et al., 2008, p. 30-31
Nurses’ work schedules

Long shifts
In addition to a high patient load and an inadequate number of staff, nurses work long (8- or 12-hour) shifts with little time to recuperate in between (Rogers, Hwang, Scott, Aiken, & Dinges, 2004). This can lead to higher job dissatisfaction, absenteeism, and the number of sick days (Rogers et al., 2004).

Mandatory overtime
A study by Rogers et al. found that 28.7% of the RNs sampled worked “mandatory” overtime (2004); even more startling, 60% of RNs who took part in the American Nurses Association Staffing Survey reported working mandatory overtime. In most cases, nurses stayed an hour more than scheduled (Rogers et al., 2004). Work by Rogers (2003) shows that approximately one-quarter of 8-hour and 12-hour shifts last one hour longer than scheduled (in Page, 2004, p. 235).

Only California, Oregon, Maine, and New Jersey have bills forbidden mandatory overtime (Rogers et al., 2004).

Risk for errors
The length of the shift, working overtime, and the number of hours worked per week affect the number of errors made—the risk of making an error is three times greater when the shift is 12.5+ hours. There is a significant increase in the risk of making an error when working overtime, regardless of the length of the shift (Rogers et al., 2004). In the study, more than half the errors were in medication administration (Rogers et al., 2004).

“[Mandatory overtime] is...nurses’ being told that they could be fired, be subjected to disciplinary proceedings, or lose their nursing license if they refused to stay beyond their regularly scheduled shift or come in to work on their day off. Although not actually threatened...nurses also report feeling that there will be repercussions if they refuse...”

Rogers et al., 2004, p. 209

![Scheduled and actual shift lengths](image-url)
Where nurses work

Location
80.6% of documentation and 69.2% of care coordination is done at the nurses’ station. 2.8% each of documentation and care coordination was done in the patient room (Hendrich et al., 2008).

Nurses spend 38.6% of their time at the nurses’ station, 30.8% of time in patient room, 23.7% of time elsewhere on the unit, and 6.9% of time off the unit. But 43.3% of work is done at the nurses’ station and 37.4% in the patient room (Hendrich et al., 2008).

Walking + Trips
Hendrich et al. (2008) found that nurses walk a median of 3.0 miles a day, compared to 2.1 miles when not working, and 2.2 miles during the night shift. They found no data to support the hypothesis that layout affects the total distance walked per shift.

Hendrich and Chow (2008) suggest that nurses adapt to their work environment: nurses in units with one medication station went to the station and to patients’ rooms fewer times than nurses in units with multiple medication stations. It could be that the nurses in the former scenario simply planned and combined their trips, leading to a more efficient work process (which is what the multiple medication station layout tried to accomplish).

A study by Seo et al. (2008) similarly found that a larger ward led to fewer pit stops than in a smaller ward, but also to fewer interactions among staff.

For a 12-hour shift, how many hours nurses spend in different locations.

WHAT ARE THE IMPLICATIONS OF THESE FINDINGS?

Hendrich et al.’s (2008) analysis of nurses’ activities shows that nurses spend a majority of time at the nurses’ station and around the unit (in medication rooms, equipment & supply rooms, with family and visitors). At the same time, they have to keep an eye on patients. Therefore, the proximity of spaces and the visibility of patient rooms are key.

Where nurses work can affect the work that they undertake. For example, nurses usually give their charts to clerks for transcription. But when using decentralized stations, nurses transcribe at their own stations instead of spending time walking to the central station, adding to the nurses’ workload (Keenan, in HFM, 2006).

When nurses take care of patients in adjacent rooms, walking distances decreases (Hendrich et al., 2008); therefore, efficiency is not only a function of physical layout, but also of how work is assigned.
In 2001, a report by the Institute of Medicine (IOM, 2001) identified six goals of care; care must be safe, timely, efficient, effective, patient-centered, and equitable. Health-care facilities achieve these goals through the design of the facilities, the products used in the facilities, and the work processes emphasized in the facilities. Though seemingly distinct, these three factors affect one another; for example, a change in work process may necessitate a change in unit design.

Standards of care
Though nurses are in general overworked, fatigued, and stressed, they want to maintain a high standard of patient care and take pride in their work. However, they can be impeded by task definitions, hierarchies, and a lack of empowerment (Tonuma & Winbolt, 2000). A study by Takase, Maude, & Manias (2005) showed that nurses rated their job performances positively, regardless of whether environmental characteristics (amount of pay + recognition; opportunities for advancement; challenges in work; job security; respect) were high or low. Instead of dropping their values and standards of work to match low ratings of the environment (the expected outcome), nurses worked to change the organization’s view of the importance of nurses’ values.

In patient-centered care, the comfort and well-being of staff is also a priority (Flynn, 2005).

Organizational structure
In a before and after case study by Lundgren & Segesten (2001), removing the position of the nurse manager so that all nurses were responsible for the totality of their patients’ care and no one acted as a supervisor had positive results for both patients and staff. Patients felt more consistency in their care and nurses spend slightly more time on direct patient care. Nurses had more autonomy, more opportunities for innovation, decreased feelings of workplace complexity, and improved relationships with their peers.

Eliminating the within-nurse hierarchy lead to higher nurse autonomy, better peer relationships, and positive patient experiences.
Interdisciplinary teams
As part of patient-centered care, which emphasizes the needs of the patient and family, there has been a move towards collaborative care/interdisciplinary teams (nurses, physicians, and allied health professionals working as a team) and involving family in the patient’s care. With numerous team members, communication becomes key.

Although Interdisciplinary collaboration is important—it improves the quality of patient care (Harrell, 2006)—nurses are often absent or reluctant to participate because of scheduling conflicts, general busyness, and anxieties regarding “professional socialization” (Miller et al., 2008).

“Emotion work”
Nurses engage in what Miller, Reeves, Zwarenstein, Beales, Kenaszchuk, and Conn (2008) term "emotion work"—the management of the emotions of the self and others. For nurses, it is important to adhere to the image of the “kind” and “nurturing” nurse who connects with patients on a social level and who doesn’t argue with doctors and physicians. Changing models of patient care and organizational structure are giving nurses more right to express their opinions and challenge their peers. Healthcare professionals are still expected to maintain decorum in front of patients.

WHAT ARE THE IMPLICATIONS OF THESE FINDINGS?
How can the environment and work processes support nursing culture? Physicians, who are not always on the ward, may not know about the work that nurses do. How can nurses’ work be highlighted? How can the hierarchy be broken down so that physicians and nurses have a better understanding of one another, and build relationships conducive to sharing and collaborative decision-making?
Factors affecting work

Considering the myriad of responsibilities bestowed upon nurses, it is a wonder how they actually perform all of their work. Their accomplishments are not without difficulty.

Distractions + Interruptions

There are many distractions in a medical-surgical unit (lights, noise), and especially in a centralized nursing unit, which can lead to error (Fay, in HFM, 2006).

Distractions and interruptions limit the quality and amount of care that nurses provide to their patients, negatively affecting patient satisfaction and outcomes (Lundgren & Segesten, 2001).

Interruptions also cause nurses to switch tasks frequently, and thus spend little time on each task (Lundgren & Segesten, 2001). On average, nurses are interrupted eight times per shift (Tucker & Spear, 2006).

A study by Hedberg & Larsson (2004) found that nurses are interrupted often during work: in approximately 30 hours of observation, nurses were interrupted 85 times—25% of the time by nurses and 27% of the time by patients to ask questions or to ask for help; 13% of the time by noises such as telephones and alarms. They were interrupted 62% of the time while involved with direct patient care, 32% of the time while doing indirect patient care, and 6% of the time while on break. Nurses were interrupted while in patient rooms, in corridors, in medication rooms, and at nurses’ stations.

Work system failures

Work system failures, such as a break in the supply of information or medication, can also impede work; on average, there are 8.4 work system failures per 8-hour shift (Tucker & Spear, 2006).

Scheduling

Work processes that do not align with ‘the way things work’ also have negative consequences. For example, having a nurse manager assign, prioritize, and schedule tasks for the rest of the nursing staff reduces the autonomy that nurses have and creates a rigid schedule that is difficult to follow. Nurses found that they would cover for one another when the nurse assigned to the task was busy (Hedberg & Larsson, 2004).

Communication

Interruptions can occur during patient consultations and other patient-related communication. Information can become fragmented, diminishing care providers’ abilities to work as a team and make decisions. Patient confidentiality may also be compromised.

At the same time, Interruptions can provide opportunities for patients to talk to nurses on their own terms, and for casual conversations among staff to exchange information or build peer relationships (Hedberg & Larsson, 2004).

WHAT ARE THE IMPLICATIONS OF THESE FINDINGS?

It is important for nurses to have workspaces where they will not be distracted or interrupted, yet remain available to patients and staff.
Nurses work as part of a healthcare team in which communication (particularly about the patient) is critical.

**Communicating + collaborating with physicians**

Nurse-physician communication and collaboration is an oft-studied topic in professional journals (O’Brien, Martin, Heyworth, & Meyer, 2008) and an important issue in healthcare, considering the prevalence of nurse-physician rounding and interdisciplinary collaboration. Positive nurse-physician relationships lead to higher nurse job satisfaction, lower burnout, higher retention, and higher patient satisfaction (O’Brien et al., 2008; Rochefort & Clarke, 2010; Vahey, Aiken, Sloane, Clarke, & Vargas, 2004). However, nurse-physician relationships remain problematic and there exist many barriers to effective collaboration (O’Brien et al., 2008).

Nurses and physicians may have different views of what is considered ‘important’ information (Wanzer, Wojtaszczyk, & Kelly, 2009). Doctors paid little attention to nurses’ descriptions of patients’ psychological and social states, when tending to patients’ psychosocial needs is a core component of nurses’ values (Miller et al., 2008). This showed that doctors lack an understanding of the scope of nurses’ work (Miller et al., 2008; Wanzer et al., 2009).

The issue of hierarchy is also salient; nurses often feel that their opinions are not valued and that they are left out of decision-making, even though they hold a wealth of information about their patients (Wanzer et al., 2009). Traditionally, physicians hold a more dominant role in healthcare, and may be unwilling to share their decision-making power (Wanzer et al., 2009). For example, physicians have precedence at nurses’ stations computers, and nurses must adhere to an unwritten set of paging norms (who can page which physicians when and about what) (Miller et al., 2008). Thankfully, research showing the benefits of collaborative care have paved the way to more level nurse-physician relationships and greater respect for nursing (Ornstein, 1990).

**Handover Meetings**

The daily handover meetings are opportunities for interdisciplinary communication. It is a time for care providers to catch up with the progress of their patients and to write and implement care plans. Manias & Street (2000) studied the morning “global handovers” in a 16-bed critical care unit in Melbourne, Australia:

Every morning, incoming nurses attend a “global handover” and are given an overview of the patients. They then go to patient-specific “bedside handovers.” Oral communication in this unit was critical; there existed an atmosphere in which nurses who ‘knew’ what to do and did not need to write things down or look things up were highly regarded.

**Global handovers.** Manias & Street (2000) observed that the night-shift nurse coordinator would speak mainly to the day-shift nurse coordinator and assumed that the nurses knew the details about all the patients (their condition, diagnosis, etc.). Few comments were directed to nurses, who sat out of direct eye contact. Nurses were afraid to ask questions during the global handover, even if they had legitimate reasons for not know what was expected (for example, a new patient had been admitted while they were off shift). The meetings were very structured and started even if all the nurses were not present. The meeting took place away from nurses’ and doctors’ usual workspaces, which gave the nurse coordinators greater control and authority.

**Bedside handovers.** Nurses were more involved in bedside handovers, providing information to physicians. However, they felt that if they were asked questions, it was because they were being
Design dilemma | Nurses’ stations

Critiqued, not because the questioners wanted more clarity. Though staff ‘higher’ in the hierarchy would try to reassure nurses, nurses felt much anxiety. Nurses also felt that they were being judged on the tidiness of the patient and room. They felt lots of personal responsibility and felt that they were expected to always be doing something (“tyranny of busyness”). Even though nurses were empathetic towards one another—there is not always time to tidy rooms or arrange desks—they would feel some discontentment that they would have to pick up the slack of the outgoing nurse.

Rounds

Nurse-physician or interdisciplinary rounding improves communication among staff and between staff and patient, leading to greater patient satisfaction, safety, and outcomes. It is becoming a “best practice.” Manias & Street’s (2001) study of nurse-physician rounding found many difficulties: Nurses sometimes did not show up for rounding; doctors saw rounds as opportunities to train doctors, instead of opportunities for staff collaboration; nurses were consulted only on “housekeeping matters” and were not involved in drawing up patients’ care plans. As a result, nurses’ intimate knowledge about the patient’s care, condition, progress, psychosocial aspects, and family members were neglected. Furthermore, when nurses were present, they were pushed to the sides, away from the patient and with few opportunities to speak or interject.

Manias & Street’s two ethnographic studies of nurse-physician collaboration paint a bleak picture. However, that is not to say that endeavors to improve nurse-physician relationships are not being explored or implemented. Wanzer et al. (2009) found that nurses’ satisfaction with physician communication + relationship, job satisfaction, and perceptions of collaboration are strongly positively correlated to physician’s use of nurse-centered communication. Specifically, nurses reacted positively to physicians who listened, communicated clearly, used humor, were available, and were empathetic.

Communicating and collaborating with nurses

“Esprit de corps”

Nurses have a strong sense of identity; their ‘esprit de corps’ relates to their feelings of “belonging and solidarity” in spite of the fact that they were traditionally subordinate to doctors, physicians, and hospital administration (Miller et al., 2008). Socialization among nurses is important (Flynn, 2005; Vance, in HFM, 2006) and their support for one another is manifested through sharing meals, “physical familiarity” (for example, touching on the shoulder), informal conversations, and thank-you notes (Miller et al., 2008). In a brief ethnographic study of nurses, Lee (2001) studied the morning tea break “ritual” that nurses took between 10 and 11am every morning. The tea break let nurses complain to one another, catch up, laugh, and shout—to let loose and take a break from their busy schedules.

“The tea break probably just keeps our brains alive and off work.”

“If you’ve had a foul morning, and then everyone sympathizes with you... friends at home don’t want to listen to it because they’re not nurses...”

Hierarchy

Depending on the organizational structure of the hospital, there may be a hierarchy of nurses within a unit. For example, nurse managers may be in charge of assigning patients to nurses, and of communicating patient information to physicians during hand-offs. Having a nurse manager may be an efficient way of consolidating and exchanging
information. There may also be nursing students working in a unit, under the usual RNs, PAs, and NAs. In both cases, communication between nurses is necessary and spaces to discuss confidential information are required.

Within a hierarchy, there are also expectations of what is allowed or now allowed. For example, managers may think that nurses socializing at a nurses’ station is disruptive and irrelevant to their work, when it is an important de-stressor for the nurses. Student nurses might also be expected to refrain from sitting and to be active at all times (Wakefield, 2002).

**Patient access**

Nurses want to have views of the patient at all times (Harrell, 2006). In a study by Seo et al. (2008), nurses were hesitant to make extra stops between their substations (charting alcoves between two patient rooms) and the medication station, because they could not see the patient outside of the substation.

**Social control**

The nurses’ stations act as mechanisms of social control, centers where nurses enforce order and rule. There are expectations of visitors and “semi-official members” (such as doctors from other departments and allied health professionals) to follow “life-laws,” such as seeking permission from nurses to enter the ward to visit patients or meet with peers. There is a “ceremonial order” that must be followed—a sequence of expected actions and requests. For example, visitors entering outside visiting hours are expected to announce themselves to a nurse and ask permission for entry (and have a legitimate reason for the untimely visit). Nurses are expected to question and chide the visitor, then either bend the rules or refuse entry. (Wakefield, 2002)

**What are the implications of these findings?**

Nurses must work in places where they can monitor both patients and the flow of visitors, and where visitors can see the nurse upon entry.
EXISTING SOLUTIONS

Centralized nurses’ stations
One central hub

Pros
• Space for everyone—allows for group meetings, facilitates interdisciplinary collaboration
• Ample opportunities for social interaction and communication
• Central location for documents, resources
• Easy for nurses to monitor entrances and for visitors to see nurses’ station
• Greater sense of team, cohesion

Cons
• Can be noisy and crowded due to the high number of users
• Disruptive work environment; interruptions are likely
• Lack of privacy for conversations about patient, with other nurses, physicians, and/or family
• Can decrease proximity to medication stations, supplies, storage, and patient rooms
• Limited visibility of patient rooms

“[P]laces are invested with meanings...Places are flexible in the hands of different people, and contested and malleable over time.”

Osterlund, 2008

Tradeoffs
• Supports social interaction but noise can limit ability to rest
• Increased proximity to colleagues but decreased proximity to patients

Open, centralized nurses’ station with direct visibility of all patient rooms. NICU, Naval Medical Center, San Diego, CA. Image from http://www.med.navy.mil/sites/nmcsd/Pages/News/news-20090814.aspx

**EXISTING SOLUTIONS**

**Decentralized nurses’ stations**
Multiple mini-stations across unit; distribution patterns vary

**Pros**
- Visibility of patient at all times
- Increased proximity to patient
- For families, nurses are close to patient/easy to find
- Adequate space for technology (COWs, laptops)
- Reduces noise levels (Boulenger, in HFM, 2006), minimizes distractions and interruptions
- Can increases proximity to medication rooms, supplies, etc.
- Increased workspace per nurse

- Feelings of isolation
- Difficult to maintain social control of unit and for new visitors to find nurses
- Limits spontaneous and casual social interactions with staff
- Limits visibility of colleagues and ability to “pitch in for one another” (Hebert, in Flynn, 2005)
- Unwelcoming orientation—nurses sit with backs to circulation paths
- ‘Out in the open’ → lack of privacy; no depth of space
- Multiple locations for documents → storage, security issues
- There are many possible configurations of decentralized nurses’ stations within a unit—findings for one configuration may not translate to another.

“[We were so] decentralized we wouldn’t know if everyone showed up for a shift.”

Julie Hebert, clinical manager, in Flynn, 2005, p. 26

Various configurations of decentralized nurses’ stations.
**EXISTING SOLUTIONS**

**Decentralized nurses’ stations (cont.)**

**Tradeoffs**
- May have to built decentralized medication rooms, supply rooms, storage rooms to accompany decentralized stations
- More personal space and quiet for nurses, but since it is more difficult to find nurses, paging systems or locators may have to be implemented → different form of interruption

Decentralized stations act as ‘charting alcoves’.
Pros: windows to patient rooms for visibility; quieter than central station. Cons: backs to hallway; lack of privacy; no shelving/storage space. Image from Flynn, 2005.

Decentralized nurses’ stations and charting alcoves. Medication, supplies, and support rooms are no more than 60 feet from nurses’ stations. (Miovski, 2009)
**Hybrid model**

One central station + distributed substations (usually between 2 patient rooms)

**Pros**
- Fits patient-centered care models: proximate to patient, serves family and visitor needs
- Choice of quick meetings at substation, or more privacy at centralized meeting spaces
- Facilitates interdisciplinary collaboration + rounding: provides a meeting place; can prep, do any quick work at substations

**Cons**
- Difficult to find nurses; they can be at central station or substation (or patient room, or any one of numerous supply or medication rooms)
- Unorganized dispersal of paper records

**Tradeoffs**
- Spaces may become underutilized: when collaborating with physicians at central station, substation is empty; when nurses work independently at substations, central station is empty.
- Different team members may have differing preferences + needs for workspaces. For example, doctors take charts from substations and bring them to the centralized station so they have more privacy and use computers to review patient records (Keenan, in HFM, 2006).

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**Nurses’ substation between patient rooms.** Villages Regional Hospital, Nashville, TN placed sub-stations and sub-medication + supplies rooms between patient rooms, in addition to a central station. (Flynn, 2005)
**EXISTING SOLUTIONS**

**Curbside, step-in, & immersive workspaces**

Three levels of workspace:

1) **Curbside** supports standing work—informal or impromptu conversations, quick documentation.

2) **Step-in** supports more involved, sitting work—referencing patient records, documentation, phone calls, ordering medication, small team meetings.

3) **Immersive** workspace supports team-based work, such as handover meetings, and media such as projectors and whiteboards.

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Nurses’ station with three levels of workspaces. (Bromberg, 2006)

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**Tradeoffs**

- Valuable space can be left unused; for example, immersive workspaces are usually used twice per day for handovers. They could double as break rooms.
- Or, long-term patient information (such as x-rays in the photo to the left) can be displayed and be easily accessible.
Three-tier supplies system

A method of organizing supplies:

1st tier  Supplies common to every patient are stored in every room

2nd tier  Frequently-used supplies such as procedure trays, IV fluids, and catheters are stored near patient rooms

3rd tier  Infrequently-used supplies and extra 1st and 2nd tier supplies are stored in a centralized space

Tradeoffs

• More convenient for nurses, but makes inventory more difficult and supplies/supply carts more timely to assemble. Since time = money, decentralized supply systems are more costly (Harrell, 2006).

Separate corridors

2 separate corridors: one for family and one for staff (HFM, 2004).

Tradeoffs

• Less noise and hides work from family, but can reduce family-staff interactions/communication
• Wasted space in family corridor; not used often, but must meet space allocation regulations

A ‘racetrack’ layout with various design strategies. The ICU at Marymount Hospital, Cleveland, OH. Adapted from Harrell, 2006.
RECOMMENDATIONS

Use a hybrid model that combines a centralized station with distributed nurses’ stations.

Rest
Central stations can act as socialization and rest space for nurses, while substations are individual work stations. Nurses need time for socialization and rest, but are often uncomfortable taking long breaks or naps away from their patients. A central nurses’ station gives nurses a place to take a break while still being in the unit and aware of what’s going on.

Choice, Privacy
Hybrid models give nurses and other hospital caregivers choice. With only a centralized station or only substations, it is difficult to accommodate the levels of collaboration and communication that take place—for example, small groups can work comfortably in central stations, but would be crowded and without privacy at a substation.

Collaboration
Substations give nurses the space and quiet they need to work on their own, but they also need larger meeting spaces to work with peers. A centralized nurses’ station with immersive work spaces would grant this space, and designate a location for patient records and technology. Isolated meeting spaces would take caregivers away from the environment in which they work.
RECOMMENDATIONS

Nurses’ stations should have visibility of patients and of circulation paths.

Medication and supply rooms should have visibility of patient rooms.

A nurses’ station must be located near the unit entrance.

Patient safety
Nurses want to be able to monitor their patients at all times. They should be able to hear alarms from patient rooms and to see any potential risks (such as patient falls). Nurses did not want to make extra stops between a substation and a medication room because they could not see their patients away from their substations (Seo et al., 2008). However, the extent to which nurses will wander away from their patients depends on their patients’ conditions (Seo et al., 2008).

Communication
By facing circulation paths, nurses are more aware of the people going past them, as compared to when nurses sit with their backs to paths (such as charting alcoves). This orientation gives the image that nurses are ‘open;’ family and staff may be less likely to fear interrupting nurses, and thus increase communication and build relationships.

Social control
Nurses are “gatekeepers” of the unit as well as greeters. Therefore, they must be present where individuals enter and exit.

Possible solutions
Use a tiered supplies system.
**RECOMMENDATIONS**

Support social interaction at nurses’ stations (while minimizing noise and distractions).

**Communication**
Central nurses’ stations often become crowded, hectic, noisy spaces that are disruptive for work (Keenan, in HFM, 2006) but conducive for socialization. Down-time for nurses to rest and socialize are important, as nurses look to each other for social support (Lee, 2001). Nurses also pitch in for one another (Hebert, in Flynn, 2006). But, socialization cannot get in the way of patient care.

**Interruptions**
Nurses are constantly interrupted by people and the environment. To work effectively and efficiently, nurses need quiet. At the same time, they need to be reachable whenever needed.

**Possible solutions**
Use decentralized nurses’ stations that accommodate 2–3 nurses. Small groups lead to less noise, but allow for socialization. A small number also makes it possible for all patient rooms to be visible at the same time from the station. With more than one nurse per station, nurses can take breaks and walk further from their patients while knowing that colleagues are available in emergencies.

Nurses’ perceptions of staffing adequacy (which affects job satisfaction) are affected by the number of beds/unit (Mark et al., 2002). By decreasing the number of patients that a nurse can see and is secondarily responsible for, nurses may feel less overwhelmed.

Two to three-nurse stations. A possible way to distribute small group stations. Decentralized stations have visibility of patient rooms and are proximate to staff support spaces.
RECOMMENDATIONS

*Increase flexibility of spaces so that nurses can work at stations or in patient rooms.*

**Patient outcomes**
More nursing time with patients is correlated to better patient outcomes (Hendrich et al., 2008). If nurses can work alongside patients on their care—a component of patient-centered care—they can kill two birds with one stone—document while communication with their patients. If patients do not want to be involved, or if work is noisy and disruptive, nurses can work at nurses’ stations.

**Possible solutions**
Family spaces can include desks where nurses can work and dock laptops. Families will likely want desks and room for laptops as well.

Develop movable nurses’ stations. The stations can “dock” in alcoves. Alcoves can be fitted with screens for acoustic and visual privacy, and seating. When nurses are not docked in alcoves, they can be used for sensitive conversations, or as family areas.


Ci Desk Mobile Workstation. Movable & lightweight, with storage space and a work surface. Images from http://www.creativeindustrialobjects.com/cidesk.htm
**RECOMMENDATIONS**

*Increase the prominence of nurses and/or their work in meeting spaces.*

**Collaboration**

Nurses are one-half of the nurse-physician team, but they are often not present for meetings or rounds because of scheduling conflicts or poor nurse-physician relationships (Miller et al., 2008). Increasing the ability of nurses to communicate with physicians even when absent, and reminding physicians to include nurses in decision-making are two ways that nurses can play a bigger role in interdisciplinary care.

**Possible solutions**

High-tech: Multiple touch screen computers in meeting rooms, one per nurse. Nurses can prepare ‘desktops’ of information that can be viewed whether or not s/he is present. The computers can be linked to patient monitoring systems, so that vitals can be referenced during meetings, and so rooms can, if desired, become “control centers.” In effect, the computers are digital folders of patient information. Touch screens can also be installed in patient rooms and linked to systems in the meeting rooms. Thus, patients and families can be shown information about their condition and care at any time. Screens in patient rooms can also double as entertainment centers. A downfall is that technology is costly and users need training.

Lowtech: Use ‘collaboration care plan forms’ that have columns for each individual on the team; for example, a physician column and a nurse column. Notes, decisions, information from each individual can be marked down. Individuals will be reminded to communicate with their team members whenever they make a decision.

Ensure that meeting rooms are large enough for every member to sit around the table. In ethnographic studies, nurses often sat against the wall, where they could not participate (Manias & Street, 2000).

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Microsoft Surface. Healthcare applications are available, such as the one shown for explaining care procedures to patients. Further applications for enhancing collaboration and information sharing can be developed. Image from http://www.fastcompany.com/blog/chris-dannen/techwatch/11-killer-apps-microsoft-surface-videos

High-tech meeting rooms. Immersive spaces should be large and can double as sit-in spaces and nurses’ stations. Image from http://magiclightimaging.com/commercialinteri.html
RECOMMENDATIONS

Provide different types of workspaces to support varying levels of immersion.

Work processes
Nurses move from place to place during the workday—from patient rooms to nurses’ stations to medication rooms etcetera. Their schedules and their peers’ (physicians’, other nurses’) schedules are hectic and do not always meet up when desired (Miller et al., 2008). The unit should support work whenever and wherever it happens, should it be on the fly or planned.

Possible solutions
Follow the three levels of workspaces: curbside, step-in, and immersive. Curbside spaces are for quick work—to jot something down or look something up. Step-in work relates to documentation, care coordination, and patient communication (with staff or family). Immersive work is step-in work at a deeper level; it can involve more people or look at an issue in more detail and require more resources.
Design dilemma | Nurses’ stations

WORKS CITED


Steelcase (2005). Rethinking the nurses’ station.


