

EVIDENCE FOR DESIGN OF DECENTRALIZED VS. CENTRALIZED NURSE STATIONS

RELEVANT CADRE RESEARCH:

Title: **An Empirical Examination of the Impacts of Decentralized Nursing**
Period: January 2010 to October 2012
Collaborators: University of Texas, MD Anderson Cancer Center, University of Kansas
Location: 3 inpatient units of the University of Texas, MD Anderson Cancer Center
Findings: Data demonstrate that decentralized unit nursing and physical design models result in quality of work improvements associated with documentation, medication and supplies.

Title: **Towards optimizing inpatient unit design and care model: a measure to predict nurse walking distance on hospital bed units**
Funds: Herman Miller
Period: 2007-2012
Collaborators: The Research and Education Institute (TREI) of the Texas Health Resources.
Findings: The WDM successfully predicted total walking, within one standard deviation around mean actual walking by registered nurses, on 4 of 5 units included in the study. On the fifth unit, the WDM predicted value was two standard deviations from the mean of actual walking distance. The fifth unit was in the process of operationalizing a new EMR system, which may have affected normal walking behavior by registered nurses.

RESEARCH ARTICLES

CADRE Publications

Pati, D., et al. (2012). "Estimating Design Impact on Waste Reduction: Examining Decentralized Nursing." [Journal of Nursing Administration](#) **42**(11): 513-518.

The objective of this study was to understand the impact that decentralization of nursing support spaces may have on the total distances nurses walk and hence the magnitude of time that can be

diverted to productive use. Reducing nurse walking has attracted attention from multiple perspectives—human factor, system performance, lean process, care quality, and safety. A simulation-based experimental study was designed that incorporated task frequency data from a nationwide sample of 700 RNs. The simulation runs were conducted on a 30-bed medical-surgical unit, over 12-hour day shifts, in which physical locations of 8 nursing support spaces were systematically manipulated. Findings suggest that total walking time can be reduced by as much as 67.9%, depending on the level of decentralization. Care quality and efficiency issues can be significantly addressed through appropriate levels of decentralization.

Pati, D., Harvey, T. E., Redden, P., Summers, B., & Pati, S. (2015). "An Empirical Examination of the Impacts of Decentralized Nursing Unit Design". *Health Environments Research & Design Journal*, **8**(2): 56-70.

Objective: The objective of the study was to examine the impact of decentralization on operational efficiency, staff well-being, and teamwork on three inpatient units.

Background: Decentralized unit operations and the corresponding physical design solution were hypothesized to positively affect several concerns—productive use of nursing time, staff stress, walking distances, and teamwork, among others. With a wide adoption of the concept, empirical evidence on the impact of decentralization was warranted.

Methods: A multimethod, before-and-after, quasi-experimental design was adopted for the study, focusing on five issues, namely, (1) how nurses spend their time, (2) walking distance, (3) acute stress, (4) productivity, and (5) teamwork. Data on all five issues were collected on three older units with centralized operational model (before move). The same set of data, with identical tools and measures, were collected on the same units after move in to new physical units with decentralized operational model. Data were collected during spring and fall of 2011.

Results: Documentation, nurse station use, medication room use, and supplies room use showed consistent change across the three units. Walking distance increased (statistically significant) on two of the three units. Self-reported level of collaboration decreased, although assessment of the physical facility for collaboration increased.

Conclusions: Decentralized nursing and physical design models potentially result in quality of work improvements associated with documentation, medication, and supplies. However, there are unexpected consequences associated with walking, and staff collaboration and teamwork. The solution to the unexpected consequences may lie in operational interventions and greater emphasis on culture change.

Non-CADRE Publications

Cai, H. and C. Zimring (2011). "The impact of nurse station typology on nurses' informal communication and learning." *World Health Design*: 60-67.

This study examines the impact of decentralised and centralised nurse stations on the way nurses communicate with each other.

Becker, F. (2010). Nursing Unit Design Communication and Teamwork: An Ecological Approach to Integrated Healthscape Strategies. 3rd Annual Conference of the Health and Care Infrastructure Research and Innovation Centre, Edinburgh, Scotland, HaCIRIC: 3rd Annual Conference of the Health and Care Infrastructure Research and Innovation Centre.

The healthcare literature consistently cites ineffective communication and teamwork among caregivers as a critical factor contributing to poor quality of care; yet little research has explored how nonsocial factors (i.e., the physical design of the nursing unit) impact them. This paper summarizes the results from three pilot studies exploring the spatial ecology of communication patterns. A common thread from these case studies is that virtually no communication occurred between the nurses and the doctors; decentralized designs did not function in practice as anticipated; and the small design details influenced observed behavior. While the research generated useful insights, the author argues that going forward an Integrated Healthscape Strategy (IHS) is needed that pays more attention to the development of ecological frameworks to guide such research, to the intended purposes of the research, and to ways for engaging key decision makers in using the EBD process to improve quality of care, the patient experience, and the staff work environment.

Zborowsky, T., et al. (2010). "Centralized vs. decentralized nursing stations: effects on nurses' functional use of space and work environment." *HERD* 3(4): 19-42.

OBJECTIVE: Evidence-based findings of the effects of nursing station design on nurses' work environment and work behavior are essential to improve conditions and increase retention among these fundamental members of the healthcare delivery team. The purpose of this exploratory study was to investigate how nursing station design (i.e., centralized and decentralized nursing station layouts) affected nurses' use of space, patient visibility, noise levels, and perceptions of the work environment.

BACKGROUND: Advances in information technology have enabled nurses to move away from traditional centralized paper-charting stations to smaller decentralized work stations and charting substations located closer to, or inside of, patient rooms. Improved understanding of the trade-offs presented by centralized and decentralized nursing station design has the potential to provide useful information for future nursing station layouts. This information will be critical for understanding the nurse environment "fit."

METHODS: The study used an exploratory design with both qualitative and quantitative methods. Qualitative data regarding the effects of nursing station design on nurses' health and work environment were gathered by means of focus group interviews. Quantitative data-gathering techniques included place- and person-centered space use observations, patient visibility assessments, sound level measurements, and an online questionnaire regarding perceptions of the work environment.

RESULTS: Nurses on all units were observed most frequently performing telephone, computer, and administrative duties. Time spent using telephones, computers, and performing other administrative duties was significantly higher in the centralized nursing stations. Consultations with medical staff and social interactions were significantly less frequent in decentralized nursing stations. There were no indications that either centralized or decentralized nursing station designs resulted in superior visibility. Sound levels measured in all nursing stations exceeded recommended levels during all shifts. No significant differences were identified in nurses' perceptions of work control-demand-support in centralized and decentralized nursing station designs.

CONCLUSIONS: The "hybrid" nursing design model in which decentralized nursing stations are coupled with centralized meeting rooms for consultation between staff members may strike a balance between the increase in computer duties and the ongoing need for communication and consultation that addresses the conflicting demands of technology and direct patient care.

Guarscio-Howard, L. and K. Malloch (2007). "Centralized and decentralized nurse station design: an examination of caregiver communication, work activities, and technology." *HERD* 1(1): 44-57.

The healthcare construction boom requires evidence for effective design of nurse stations, including evidence supporting workflow processes, computerization, integration of technology, communication of caregivers, and optimal patient outcomes. This article describes the examination of a traditional centralized nursing station using a total patient care delivery model and minimal computerization and a highly computerized, decentralized nursing station using a team nursing model. Results specific to communication activities, time with patients, number of patient visits per registered nurse, and patient satisfaction with response time are reported.