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**Literature search results**

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**Search details**

Redesigning an emergency resuscitation room using simulated clinical experiences (real life rather than virtual).

**Resources searched**

NHS Evidence; TRIP Database; Cochrane Library; CINAHL; HMIC; Health Business Elite; MEDLINE; Google Scholar; Google Advanced Search

**Database search terms:** (redesign* OR re-design* OR design), ("emergency room"* OR "emergency department"* OR ED OR "accident and emergency" OR "resuscitation room"* OR "hospital room"* OR "patient room"* OR facil* OR ward* OR department* OR room* OR building* OR "physical space"* OR architecture* OR theatre* OR "operating department"* OR OD OR "operating theatre"* OR ITU OR "intensive care" OR CCU OR "critical care" OR trauma), (simulat* OR mock-up* OR "mock up"* OR scenario* OR experiential OR experience* OR "physical model"* OR real-life OR "real life" OR "space management")

**Evidence search string(s):** (hospital OR emergency OR room) redesign (simulation OR mock-up)

**Google search string(s):** (hospital OR emergency OR room) redesign (simulation OR mock-up)

**Summary**

There is a paucity of information in redesigning hospital rooms/facilities using simulated clinical experiences. Published research tends to focus more on service redesign rather than physical spaces and where researchers have redesigned rooms using simulation this tends to be virtual (using a computer mock-up of a room) rather than a physical mock-up.

The relevant results of your literature search are below. If you would like me to re-do this
search with different keywords or to amend it in any way, please let me know.

Guidelines and Policy
Department of Health
Accident and Emergency departments – planning and design guidance, 2013

Published research – Databases


Background: Human factors engineering has allowed a systematic approach to the evaluation of adverse events in a multitude of high-stake industries. This study sought to develop an initial methodology for identifying and classifying flow disruptions in the cardiac operating room (OR).

Methods: Two industrial engineers with expertise in human factors workflow disruptions observed 10 cardiac operations from the moment the patient entered the OR to the time they left for the intensive care unit. Each disruption was fully documented on an architectural layout of the OR suite and time-stamped during each phase of surgery (preoperative [before incision], operative [incision to skin closure], and postoperative [skin closure until the patient leaves the OR]) to synchronize flow disruptions between the two observers. These disruptions were then categorized.

Results: The two observers made a total of 1,158 observations. After the elimination of duplicate observations, a total of 1,080 observations remained to be analyzed. These disruptions were distributed into six categories such as communication, usability, physical layout, environmental hazards, general interruptions, and equipment failures. They were further organized into 33 subcategories. The most common disruptions were related to OR layout and design (33%).

Conclusions: By using the detailed architectural diagrams, the authors were able to clearly demonstrate for the first time the unique role that OR design and equipment layout has on the generation of physical layout flow disruptions. Most importantly, the authors have developed a robust taxonomy to describe the flow disruptions encountered in a cardiac OR, which can be used for future research and patient safety improvements.

Simulation and mock-up research methods to enhance design decision making.
Author(s) Peavey EK, Zoss J, Watkins N
Citation: HERD, 2012, vol./is. 5/3(133-44)
Available in fulltext at HERD : Health Environments Research and Design Journal;
Collection notes: On first login to a ProQuest journal you will need to select 'Athens (OpenAthens Federation)' from Select Region, and then 'NHS England' from Choose your Library.
Available in fulltext from Health Environments Research & Design Journal (HERD) at EBSCOhost

Redesign of an urban academic emergency department: action research can make a difference.
Author(s) Ciambrone RM, Zavotsky KE, Souto K, Baron K, Joseph VD, Johnson JE, Mastro KA
Citation: Journal of Emergency Nursing, November 2012, vol./is. 38/6(531-6), 0099-1767;1527-2966 (2012 Nov)
Publication Date: November 2012
Source: Medline
Human Factors Evaluation of an Interventional Trauma Operating Room Mock-up
2012 Symposium on Human Factors and Ergonomics in Health Care
S Biesbroek, J., Shultz, CD., Kirkpatrick, A.
A state-of-the-art Interventional Trauma Operating Room (ITOR) combining the techniques of traditional surgery and interventional radiological procedures was designed to address major hemorrhage in the operating room. A Human Factors evaluation using video capture and patient simulation was conducted within a full scale mock-up environment to examine staff workflow and team integration to maximize the multi-user potential of the physical space and identify issues or barriers that would impact patient care during procedures. Recommended changes based on the evaluation included increasing the available space in the ITOR, re-organizing equipment to maximize workflow and relocating patient monitors for maximal visibility.

Simulation to assess the safety of new healthcare teams and new facilities

Introduction: Our institution recently opened a satellite hospital including a pediatric emergency department. The staffing model at this facility does not include residents or subspecialists, a substantial difference from our main hospital. Our previous work and published reports demonstrate that simulation can identify latent safety threats (LSTs) in both new and established settings. Using simulation, our objective was to define optimal staff roles, refine scope of practice, and identify LSTs before facility opening.

Methods: Laboratory simulations were used to define roles and scope of practice. After each simulation, teams were debriefed using video recordings. The National Aeronautics and Space Administration-Task Load Index was completed by each participant to measure perceived workload. Simulations were scored for team behaviors by video reviewers using the Mayo High Performance Team Scale. Subsequent in situ simulations focused on identifying LSTs and monitoring for unintended consequences from changes made.

Results: Twenty-four simulations were performed over 3 months before the hospital opening. Laboratory debriefing identified the need to modify provider responsibilities. National Aeronautics and Space Administration-Task Load Index scores and debriefings demonstrated that the medication nurse had the greatest workload during resuscitations. Modifying medication delivery was deemed critical. Lower Mayo High Performance Team Scale scores, implying less teamwork, were noted during in situ simulations. In situ sessions identified 37 LSTs involving equipment, personnel, and resources.

Conclusions: Simulation can help determine provider workload, refine team responsibilities, and identify LSTs. This pilot project provides a template for evaluation of new teams and clinical settings before patient exposure.

An immersive virtual reality mock-up for design review of hospital patient rooms
PS Dunston, LL Arns, JD McGlothlin, GC Lasker… - Collaborative Design in …, 2011 - Springer

Full scale physical mock-ups of specific hospital units such as patient rooms are routinely utilized to serve the multiple purposes of constructors, designers, and owner stakeholders for healthcare facility projects. The shortcoming with this practice is that the mock-up is constructed during the construction phase and is of
limited use for making extensive decisions regarding the functionality of the room design. Three-dimensional visualisation tools offer healthcare facility stakeholders the opportunity to comprehend proposed designs more clearly during the planning and design phases, thus enabling the greatest influence on design decision making. While several options exist, based on their experience with a bariatric patient room model, the authors promote the utilization of Virtual Reality mock-ups for design review because of their enhanced capacity for an immersive, interactive experience with the design and for the long-term utility of such models for the balance of the project life cycle.

Patient safety begins with proper planning: a quantitative method to improve hospital design.

Findings: This study tests a simulation methodology for improving patient safety through redesigning the environment. **52 clinicians were randomly assigned to examine a standardised patient in two hospital room settings using a replica of a proposed architectural plan.** The settings differed in the placement of an alcohol based hand rub dispenser. When the dispenser was in clear view of the doctors as they observed the patient, 54% sanitised their hands. When the dispenser was not in the field of view (as in the original architectural plan), 12% sanitised their hands. Based on these results, the final architectural plans were adjusted. The authors conclude that this method is an effective and relatively inexpensive way of evaluation proposed environmental solutions and identify patient safety hazards before construction begins.

Design & construction: mock-up lets patients, staff test new rooms before they are built.
Author(s) Thrall TH
Citation: Hospitals & Health Networks, July 2008, vol./is. 82/7(20, 22)
Available in fulltext from H&HN: Hospitals & Health Networks at EBSCOhost
Available in fulltext at Hospitals and Health Networks: Collection notes: On first login to a ProQuest journal you will need to select 'Athens (OpenAthens Federation)' from Select Region, and then 'NHS England' from Choose your Library.

Mock-ups as "interactive laboratories": mixed methods research using inpatient unit room mock-ups
Author(s) Watkins N, Myers D, Villasante R
Citation: HERD, 2008, vol./is. 2/1(66-81)
Abstract: OBJECTIVE: To establish evidence-based design (EBD) guidelines for inpatient rooms at Department of Veterans Affairs (VA) facilities.BACKGROUND: Simulation allows clients, designers, and researchers to visualize how users might interact with a proposed design before actual construction of the design. This study used mock-ups as a simulation technique during a study of the VA inpatient room standards. The participants used the inpatient room mock-ups as "interactive laboratory" environments to maximize opportunities for participatory design, qualitative research, and quantitative research of project-specific EBD solutions.METHODS: The research used questionnaires, scenarios, on-demand modifications, and observations to evaluate and confirm EBD solutions for inpatient room mock-ups. A total of 71 participants responded to a questionnaire administered across five mock-up work sessions. These 71 participants consisted of administrators, nurses, physicians, support staff, environment and maintenance staff, and patient and staff safety representatives from throughout the VA healthcare system.Results and Discussion: EBD solutions were tested, evaluated, and modified for each inpatient room type and were applicable to two or more of the inpatient room types. The latter included the location of patient beds and
standard headwall position, technology and spaces for nurse charting activities, clearances (e.g., equipment, wheelchair, and bariatric patient), universal rooms, and patient and family amenities. Also, EBD solutions were tested, validated, and modified to the needs of each inpatient room.

CONCLUSION: The mock-ups allowed researchers and designers to evaluate and confirm EBD solutions and strategies for the development of VA inpatient room standards. When used as a means for mixed-methods research, mock-ups can successfully integrate research and design during project-related work. EBD research using mock-ups not only addresses project- or organization-specific concerns, but it may contribute to the knowledge base of the healthcare design community.

Source: Medline
Available in fulltext at HERD: Health Environments Research and Design Journal;
Collection notes: On first login to a ProQuest journal you will need to select 'Athens (OpenAthens Federation)' from Select Region, and then 'NHS England' from Choose your Library.

Wayfinding: a quality factor in human design approach to healthcare facilities
The specific aim of this paper is the systematic analysis of interactions and reciprocal conditions existing between the physical space of hospital buildings and the different categories of individuals that come in contact with them. The physical and environmental facilities of hospital architecture often influence the therapeutic character of space and the employees. If the values of the individual are to be safeguarded in this context, priority needs to be given to such factors as communication, privacy, etc. This would mean the involvement of other professional groups such as psychologists, sociologists, ergonomists, etc. at the hospital building planning stage. This paper will outline the result of some research conducted at the University Research Center "TESIS" of Florence to provide better understanding of design strategies applied to reduce the pathology of spaces within the healthcare environment. The case studies will highlight the parameters and the possible architectural solutions to wayfinding and the humanization of spaces, with particular emphasis on lay-outs, technologies, furniture and finishing design.

Other information

Advances in Patient Safety (v. 2)
Creating a culture of patient safety through innovative hospital design, Reiling, 2005

Design Journal
Mock-ups help hospital design, Bott, 1969

Skanska (Construction company)
The Value of Mock-Ups in Healthcare Construction

University of Minnesota, College of Design project