



RESEARCH IN A SNAP

OVERVIEW

We're keeping you updated on papers added to The Center's Knowledge Repository.

Knowledge Repository News

Did you know that more than 300 entries have been added to the Knowledge Repository since January 2016? In the last two months, there were 90 citations added to the database. Since we had a workshop in May on Emergency Department Design and June is National Safety Month, we've highlighted those first.

May - June 2016

Emergency Departments

Look for our toolbox on emergency department design coming soon as part of the Affiliate+ program.

1. Baker, S. J., Shupe, R., & Smith, D. (2013). Driving Efficient Flow: Three Best-Practice Models. *Journal of Emergency Nursing*, 39(5), 481-484.
2. Choi, B. Y., Kobayashi, L., Pathania, S., Miller, C. B., Locke, E. R., Stearns, B. C., ... Jay, G. D. (2015). Detection and Measurement of Unhealthy, Environment-Derived Aerosol Materials in an Emergency Department. *HERD: Health Environments Research & Design Journal*, 9(1), 34-53.
3. Elder, E., Johnston, A. N., & Crilly, J. (2015). Review article: Systematic review of three key strategies designed to improve patient flow through the emergency department. *Emergency Medicine Australasia: EMA*, 27(5), 394-404.
4. Pierce, B. A., & Gormley, D. (2016). Are Split Flow and Provider in Triage Models in the Emergency Department Effective in Reducing Discharge Length of Stay? *Journal of Emergency Nursing*, in press.
5. Sayah, A., Rogers, L., Devarajan, K., Kingsley-Rocker, L., & Lobon, L. F. (2014). Minimizing ED Waiting Times and Improving Patient Flow and Experience of Care. *Emergency Medicine International*, 2014, e981472.
6. Welch, S. J., Asplin, B. R., Stone-Griffith, S., Davidson, S. J., Augustine, J., & Schuur, J. (2011). Emergency Department Operational Metrics, Measures and Definitions: Results of the Second Performance Measures and Benchmarking Summit. *Annals of Emergency Medicine*, 58(1), 33-40.
7. Wiler, J. L., Gentle, C., Halfpenny, J. M., Heins, A., Mehrotra, A., Mikhail, M. G., & Fite, D. (2010). Optimizing Emergency Department Front-End Operations. *Annals of Emergency Medicine*, 55(2), 142-160.e1.
8. Zocchi, M. S., McClelland, M. S., & Pines, J. M. (2015). Increasing Throughput: Results from a 42-Hospital Collaborative to Improve Emergency Department Flow. *The Joint Commission Journal on Quality and Patient Safety*, 41(12), 532-553.

The Knowledge Repository is provided with the funding support of:



Additional key point summaries provided by:



RESEARCH-DESIGN
CONNECTIONS



WANT MORE?

Visit the knowledge repository:
<https://www.healthdesign.org/knowledge-repository>

Safety: Infection Prevention

Recent discussions for infection prevention have focused on both reimbursement associated with ACA programs (MRSA and Clostridium difficile) and multidrug-resistant (MDR) pathogens. The recent additions address surface contamination and high-touch surfaces associated with contact transmission, hand-hygiene, lessons learned about Ebola, and specifics surrounding Clostridium difficile

9. Arbogast, J. W., Moore-Schiltz, L., Jarvis, W. R., Harpster-Hagen, A., Hughes, J., & Parker, A. (2016). Impact of a Comprehensive Workplace Hand Hygiene Program on Employer Health Care Insurance Claims and Costs, Absenteeism, and Employee Perceptions and Practices: *Journal of Occupational and Environmental Medicine*, 58(6), e231–e240.
10. Awali, R. A., Kandipalli, D., Pervaiz, A., Narukonda, S., Qazi, U., Trehan, N., & Chopra, T. (2016). Risk factors associated with interfacility transfers among patients with Clostridium difficile infection. *American Journal of Infection Control*, in press.
11. Baxa, D., Shetron-Rama, L., Golembieski, M., Golembieski, M., Jain, S., Gordon, M., & Zervos, M. (2011). In vitro evaluation of a novel process for reducing bacterial contamination of environmental surfaces. *American Journal of Infection Control*, 39(6), 483–487.
12. Beggs, C. B., Knibbs, L. D., Johnson, G. R., & Morawska, L. (2015). Environmental contamination and hospital acquired infection: factors that are easily overlooked. *Indoor Air*, 25(5), 462–74.
13. Cure, L., & Van Enk, R. (2015). Effect of hand sanitizer location on hand hygiene compliance. *American Journal of Infection Control*, 43(9), 917–921.
14. Deyneko, A., Cordeiro, F., Berlin, L., Ben-David, D., Perna, S., & Longtin, Y. (2016). Impact of sink location on hand hygiene compliance after care of patients with Clostridium difficile infection: a cross-sectional study. *BMC Infectious Diseases*, 16(1).
15. Diab-Elschahawi, M., Berger, J., Blacky, A., Kimberger, O., Oguz, R., Kuelpmann, R., ... Assadian, O. (2011). Impact of different-sized laminar air flow versus no laminar air flow on bacterial counts in the operating room during orthopedic surgery. *American Journal of Infection Control*, 39(7), e25–e29.
16. Diegel-Vacek, L., & Ryan, C. (2016). Promoting Hand Hygiene With a Lighting Prompt. *HERD: Health Environments Research & Design Journal*, in press.
17. Erichsen Andersson, A., Petzold, M., Bergh, I., Karlsson, J., Eriksson, B. I., & Nilsson, K. (2014). Comparison between mixed and laminar airflow systems in operating rooms and the influence of human factors: Experiences from a Swedish orthopedic center. *American Journal of Infection Control*, 42(6), 665–669.
18. Harris, D. D., Pacheco, A., & Lindner, A. S. (2010). Detecting potential pathogens on hospital surfaces: An assessment of carpet tile flooring in the hospital patient environment. *Indoor and Built Environment*, 19(2), 239–249.



19. Jou, J., Ebrahim, J., Shofer, F. S., Hamilton, K. W., Stern, J., & Han, J. H. (2015). Environmental Transmission of *Clostridium difficile*: Association Between Hospital Room Size and *C. difficile* Infection. *Infection Control & Hospital Epidemiology*, *36*(5), 564–568.
20. Julian, S., Burnham, C.-A., Sellenriek, P., Shannon, W. D., Hamvas, A., Tarr, P. I., & Warner, B. B. (2015). Impact of Neonatal Intensive Care Bed Configuration on Rates of Late-Onset Bacterial Sepsis and Methicillin-Resistant *Staphylococcus aureus* Colonization. *Infection Control & Hospital Epidemiology*, *36*(10), 1173–1182.
21. Kotsanas, D., & Gillespie, E. (2016). Disposable antimicrobial and sporicidal privacy curtains: Cost benefit of hanging longer. *American Journal of Infection Control*, in press.
22. Lesho, E., Carling, P., Hosford, E., Ong, A., Snesrud, E., Sparks, M., ... Clifford, R. (2015). Relationships Among Cleaning, Environmental DNA, and Healthcare-Associated Infections in a New Evidence-Based Design Hospital. *Infection Control & Hospital Epidemiology*, *36*(10), 1130–1138.
23. Link, T., Kleiner, C., Mancuso, M. P., Dziadkowiec, O., & Halverson-Carpenter, K. (2016). Determining high touch areas in the operating room with levels of contamination. *American Journal of Infection Control*, in press.
24. López-Gigosos, R., Mariscal, A., Gutierrez-Bedmar, M., Mariscal-Lopez, E., & Fernández-Crehuet, J. (2014). Persistence of nosocomial bacteria on 2 biocidal fabrics based on silver under conditions of high relative humidity. *American Journal of Infection Control*, *42*(8), 879–884.
25. Morter, S., Bennet, G., Fish, J., Richards, J., Allen, D. J., Nawaz, S., ... Gray, J. (2011). Norovirus in the hospital setting: virus introduction and spread within the hospital environment. *Journal of Hospital Infection*, *77*(2), 106–112.
26. Nevo, I., Fitzpatrick, M., Thomas, R.-E., Gluck, P. A., Lenchus, J. D., Arheart, K. L., & Birnbach, D. J. (2010). The Efficacy of Visual Cues to Improve Hand Hygiene Compliance. *Simulation in Healthcare*, *5*(6), 325–331.
27. Raschka, S., Dempster, L., & Bryce, E. (2013). Health economic evaluation of an infection prevention and control program: Are quality and patient safety programs worth the investment? *American Journal of Infection Control*, *41*(9), 773–777.
28. Rashidi, B., Li, A., Patel, R., Harmsen, I. E., Sabri, E., Kyeremanteng, K., & D'Egidio, G. (2016). Effectiveness of an extended period of flashing lights and strategic signage to increase the salience of alcohol-gel dispensers for improving hand hygiene compliance. *American Journal of Infection Control*, in press.
29. Schettler, T. (2016). *Antimicrobials in Hospital Furnishings: Do They Help Reduce Healthcare-Associated Infections?* Health Care Without Harm.

Ebola

30. Johnson, O., Youkee, D., Brown, C. S., Lado, M., Wurie, A., Bash-Taqi, D., ... Kargbo, B. (2016). Ebola Holding Units at government hospitals in Sierra Leone: evidence for a flexible and effective model for safe isolation, early treatment



initiation, hospital safety and health system functioning. *BMJ Global Health*, 1(1), 1–8.

31. Sugalski, G., Murano, T., Fox, A., & Rosania, A. (2015). Development and Use of Mobile Containment Units for the Evaluation and Treatment of Potential Ebola Virus Disease Patients in a United States Hospital. *Academic Emergency Medicine*, 22(5), 616–622.
32. Lowe, J. J., Gibbs, S. G., Schwedhelm, S. S., Nguyen, J., & Smith, P. W. (2014). Nebraska Biocontainment Unit perspective on disposal of Ebola medical waste. *American Journal of Infection Control*, 42(12), 1256–1257.

Safety: Falls

Falls are a persistent problem in healthcare settings and there continues to be research conducted to understand this complex set of interactions.

33. Abraham, S. (2016a). Managing Patient Falls in Psychiatric Inpatient Units: Part 1. *The Health Care Manager*, 35(1), 21–27.
34. Abraham, S. (2016b). Managing Patient Falls in Psychiatric Inpatient Units: Part 2. *The Health Care Manager*, 35(2), 121–133.
35. Cloutier, A., Yang, J., Pati, D., & Valipoor, S. (2016). Experimental identification of potential falls in older adult hospital patients. *Journal of Biomechanics*, 49(7), 1016–1020.
36. Knight, S., & Singh, I. (2016). Profile of inpatient falls in patients with dementia: A prospective comparative study between 100% single rooms and traditional multibedded wards. *Journal of Clinical Gerontology and Geriatrics*, in press, 1–6.
37. Taylor, E., & Hignett, S. (2016). The SCOPE of Hospital Falls: A Systematic Mixed Studies Review. *HERD: Health Environments Research & Design Journal*, in press, 1–25.

Other Safety-related Papers

38. Yoder, M., & Schadewald, D. (2012). The Effect of a Safe Zone on Nurse Distractions, Interruptions, and Medication Administration Errors. *Western Journal of Nursing Research*, 34(8), 1068–1069.
39. Korall, A. M. B., Lachance, C. C., Russell, C. M., Johnson, S. I., Feldman, F., Robinovitch, S. N., & Mackey, D. C. (2015). Push Forces on Vinyl and Carpet for Conventional Wheeled and Motor-Driven Floor-Based Lifts among Direct Care Staff in Long-Term Care. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 59(1), 1257–1257.

HERD Journal Additions

The published ahead of print and most recent edition of the HERD Journal provide numerous research papers that span a range of topics. (Safety-focused papers are included in the safety sections above.)

40. Annemans, M., Audenhove, C. V., Vermolen, H., & Heylighen, A. (2016). Being



- Wheeled or Walking: A Qualitative Study of Patients' Spatial Experience in Two Distinct Day Surgery Centers. *HERD: Health Environments Research & Design Journal*, 9(3), 176–189.
41. Cerruti, M. S., & Shepley, M. M. (2016). The Effects of Spatial Enclosure on Social Interaction Between Older Adults With Dementia and Young Children. *HERD: Health Environments Research & Design Journal*, 9(3), 63–81.
 42. Devlin, A. S., Andrade, C. C., & Carvalho, D. (2016). Qualities of Inpatient Hospital Rooms: Patients' Perspectives. *HERD: Health Environments Research & Design Journal*, 9(3), 190–211.
 43. Durosaiye, I. O., Hadjri, K., & Liyanage, C. L. (2016). Identifying Challenging Job and Environmental Demands of Older Nurses Within the National Health Service. *HERD: Health Environments Research & Design Journal*, 9(3), 82–105.
 44. Hadi, K., DuBose, J. R., & Ryherd, E. (2016). Lighting and Nurses at Medical–Surgical Units: Impact of Lighting Conditions on Nurses' Performance and Satisfaction. *HERD: Health Environments Research & Design Journal*, 9(3), 17–30.
 45. Hadi, K., & Zimring, C. (2016). Design to Improve Visibility: Impact of Corridor Width and Unit Shape. *HERD: Health Environments Research & Design Journal*, in press, 1–15.
 46. Harte, J. D., Sheehan, A., Stewart, S. C., & Foureur, M. (2016). Childbirth Supporters' Experiences in a Built Hospital Birth Environment: Exploring Inhibiting and Facilitating Factors in Negotiating the Supporter Role. *HERD: Health Environments Research & Design Journal*, 9(3), 135–161.
 47. Joy Lo, C.-W., Yien, H.-W., & Chen, I.-P. (2016). How Universal Are Universal Symbols? An Estimation of Cross-Cultural Adoption of Universal Healthcare Symbols. *HERD: Health Environments Research & Design Journal*, 9(3), 116–134.
 48. LaVela, S. L., Etingen, B., Hill, J. N., & Miskevics, S. (2016). Patient Perceptions of the Environment of Care in Which Their Healthcare is Delivered. *HERD: Health Environments Research & Design Journal*, 9(3), 31–46.
 49. Motzek, T., Bueter, K., & Marquardt, G. (2016). Environmental Cues in Double-Occupancy Rooms to Support Patients With Dementia. *HERD: Health Environments Research & Design Journal*, 9(3), 106–115.
 50. Nordin, S., McKee, K., Wijk, H., & Elf, M. (2016). Exploring Environmental Variation in Residential Care Facilities for Older People. *HERD: Health Environments Research & Design Journal*, in press.
 51. Pati, D., O'Boyle, M., Hou, J., Nanda, U., & Ghamari, H. (2016). Can Hospital Form Trigger Fear Response? *HERD: Health Environments Research & Design Journal*, 9(3), 162–175.
 52. Trau, D., Keenan, K. A., Goforth, M., & Large, V. (2016). Nature Contacts: Employee Wellness in Healthcare. *HERD: Health Environments Research & Design Journal*, 9(3), 47–62.
 53. Trzpuć, S. J., Wendt, K. A., Heitzman, S. C., Skemp, S., Thomas, D., & Dahl, R.



(2016). Does Space Matter? An Exploratory Study for a Child-Adolescent Mental Health Inpatient Unit. *HERD: Health Environments Research & Design Journal*, in press.

54. Yildirim, K., & Yalcin, M. (2016). An Exploratory and Comparative Evaluation on the Spatial Perception of Two Densities of Multioccupancy Hospital Rooms. *HERD: Health Environments Research & Design Journal*, 9(3), 212–227.

Other KR Additions

55. Al Horr, Y., Arif, M., Katafygiotou, M., Mazroei, A., Kaushik, A., & Elsarrag, E. (2016). Impact of indoor environmental quality on occupant well-being and comfort: A review of the literature. *International Journal of Sustainable Built Environment*, 5(1), 1–11.
56. Andersen, S. N., & Broberg, O. (2015). Participatory ergonomics simulation of hospital work systems: The influence of simulation media on simulation outcome. *Applied Ergonomics*, 51, 331–342.
57. Andrade, C. C., Lima, M. L., Devlin, A. S., & Hernández, B. (2016). Is It the Place or the People? Disentangling the Effects of Hospitals' Physical and Social Environments on Well-Being. *Environment and Behavior*, 48(2), 299–323.
58. Arnolds, I., & Nickel, S. (2015). Layout Planning Problems in Health Care. In A. H. Eiselt & V. Marianov (Eds.), *Applications of Location Analysis* (pp. 109–152). Switzerland: Springer International Publishing. Arnolds, I. V., & Nickel, S. (2013). Multi-period layout planning for hospital wards. *Health Care Modelling*, 47(3), 220–237.
59. Aromaa, S., & Väänänen, K. (2016). Suitability of virtual prototypes to support human factors/ergonomics evaluation during the design. *Applied Ergonomics*, 56, 11–18.
60. Beorkrem, C., Danilowicz, S., Sauda, E., Souvenir, R., Spurlock, S., & Lanclos, D. (2015). Keeping an Eye Out: Real Time, Real World Modeling of Behavior in Health Care Settings. In R. M. Thomsen, M. Tamke, C. Gengnagel, B. Faircloth, & F. Scheurer (Eds.), *Modelling Behaviour: Design Modelling Symposium* (pp. 459–467). Switzerland: Springer International Publishing.
61. Bosch, S. J., Apple, M., Hiltonen, B., Worden, E., Lu, Y., Nanda, U., & Kim, D. (2016). To see or not to see: Investigating the links between patient visibility and potential moderators affecting the patient experience. *Journal of Environmental Psychology*, 47, 33–43.
62. Broberg, O., Andersen, V., & Seim, R. (2011). Participatory ergonomics in design processes: The role of boundary objects. *Applied Ergonomics*, 42(3), 464–472.
63. Champion, N., Thiel, C. L., Focareta, J., & Bilec, M. M. (2016). Understanding Green Building Design and Healthcare Outcomes: Evidence-Based Design Analysis of an Oncology Unit. *Journal of Architectural Engineering*, 4016009-1–11.
64. Chraibi, A., Kharraja, S., Osman, I. H., & Elbeqqali, O. (2013). A mixed integer programming formulation for solving operating theatre layout problem: A multi-goal approach. In *Industrial Engineering and Systems Management*

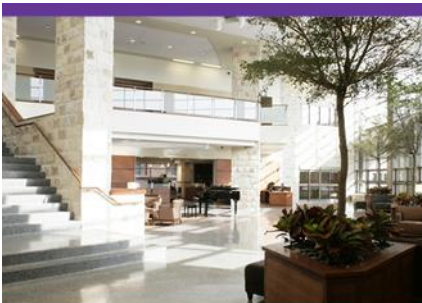


- (*IESM*), *Proceedings of 2013 International Conference on* (pp. 1–10). Rabat, Morocco: IEEE.
65. Csipke, E., Papoulias, C., Vitoratou, S., Williams, P., Rose, D., & Wykes, T. (2016). Design in mind: eliciting service user and frontline staff perspectives on psychiatric ward design through participatory methods. *Journal of Mental Health, 25*(2), 114–121.
 66. Dalton, R. C., Hölscher, C., & Spiers, H. J. (2015). Navigating Complex Buildings: Cognition, Neuroscience and Architectural Design. In S. J. Gero (Ed.), *Studying Visual and Spatial Reasoning for Design Creativity* (pp. 3–22). Dordrecht: Springer Netherlands.
 67. Evans, J., & Himmel, C. (2012). Acoustical standards and criteria documentation of sustainability in hospital design and construction. In *Acoustics 2012*. Nantes Conference.
 68. Golbazi, M., & Aktas, C. B. (2016). Analysis of Credits Earned by LEED Healthcare Certified Facilities. In *Procedia Engineering* (Vol. 145, pp. 203–210). Tempe, AZ.
 69. Hall-Andersen, L. B., & Broberg, O. (2014). Integrating ergonomics into engineering design: The role of objects. *Applied Ergonomics, 45*(3), 647–654.
 70. Hammond, A., Foureur, M., & Homer, C. S. E. (2014). The hardware and software implications of hospital birth room design: A midwifery perspective. *Midwifery, 30*(7), 825–830.
 71. Hashim, M. J., Alkaabi, M. S. K. M., & Bharwani, S. (2014). Interpretation of way-finding healthcare symbols by a multicultural population: Navigation signage design for global health. *Applied Ergonomics, 45*(3), 503–509.
 72. Horan, D. M. D. M., & Latour, J.-F. (2013). Achieving the acoustical credit within the Leadership in Energy and Environmental Design (LEED®) for healthcare green building rating system and changes within the forthcoming 2014 Guidelines. In *Proceedings of Meetings on Acoustics* (Vol. 19, p. 15009). Acoustical Society of America.
 73. Houghton, C., Murphy, K., Brooker, D., & Casey, D. (2016). Healthcare Staffs' Experiences and Perceptions of Caring for People with Dementia in the Acute Setting: Qualitative Evidence Synthesis. *International Journal of Nursing Studies*.
 74. Hua, Y., & Yang, E. (2014). Building spatial layout that supports healthier behavior of office workers: a new performance mandate for sustainable buildings. *Work, 49*(3), 373–380.
 75. Ibrahim, A. (2012). A Framework for Genetic Algorithm Application in Hospital Facility Layout Design. *IUP Journal of Operations Management, 11*(4), 16.
 76. Joseph, A., Choi, Y.-S., & Quan, X. (2015). Impact of the Physical Environment of Residential Health, Care, and Support Facilities (RHCSF) on Staff and Residents A Systematic Review of the Literature. *Environment and Behavior*, in press.
 77. Leone, C. M., Tang, C., Sharp, J., Jiang, X., & Fraser, A. (2016). Presence of human noroviruses on bathroom surfaces: a review of the literature. *International*



Journal of Environmental Health Research, online first, 1–13.

78. Lin, Q.-L., Liu, H.-C., Wang, D.-J., & Liu, L. (2015). Integrating systematic layout planning with fuzzy constraint theory to design and optimize the facility layout for operating theatre in hospitals. *Journal of Intelligent Manufacturing, 26*(1), 87–95.
79. Martins, L. B., & de Melo, H. F. V. (2014). Wayfinding in Hospital: A Case Study. In *Design, User Experience, and Usability. User Experience Design for Everyday Life Applications and Services* (pp. 72–82). Springer. Retrieved from
80. McNeil, S. J., & Tapp, L. S. (2016). The design and initial evaluation of visual cues in carpets to assist walking. *The Journal of The Textile Institute, 107*(3), 376–385.
81. Pachilova, R., & Sailer, K. (2013). The effect of hospital layout on caregiver-patient communication patterns. In *Proceedings of the Second European Conference on Design 4 Health* (pp. 174–184). Sheffield, UK.
82. Raghavendra, R. S. (2016). Ergonomical aspects of anaesthetic practice. *Indian Journal of Anaesthesia, 60*(5), 306.
83. Rooney, C., Hadjri, K., Rooney, M., Faith, V., McAllister, K., & Craig, C. (2016). Meeting the Needs of Visually Impaired People Living in Lifetime Homes. *Journal of Housing For the Elderly, 30*(2), 123–140.
84. Russotto, V., Cortegiani, A., Raineri, S. M., & Giarratano, A. (2015). Bacterial contamination of inanimate surfaces and equipment in the intensive care unit. *Journal of Intensive Care, 3*(1), 108.
85. Sadatsafavi, H., & Shepley, M. M. (2016). Performance Evaluation of 32 LEED Hospitals on Operation Costs. In *Procedia Engineering* (Vol. 145, pp. 1234–1241). Tempe, AZ.
86. Sherif, A., Sabry, H., & Wagdy, A. (2014). Hospital Patient Room Design for Desert Climates: Effect of Room Shape on Window Design for Daylighting. In *Proceedings of Second Saudi Forum for Planning and Design of Hospitals* (pp. 1–13). Riyadh, Saudi Arabia.
87. Sherif, A., Sabry, H., Wagdy, A., Mashaly, I., & Arafa, R. (2016). Shaping the slats of hospital patient room window blinds for daylighting and external view under desert clear skies. *Solar Energy, 133*, 1–13.
88. Simeone, D., Toldo, I., & Cursi, S. (2014). Operational Scenarios Simulation to Support Building Design: A Hospital Design Case Study. In *Modelling and Simulation for Autonomous Systems* (pp. 127–137).
89. Zadeh, R. S., Xuan, X., & Shepley, M. M. (2016). Sustainable healthcare design: Existing challenges and future directions for an environmental, economic, and social approach to sustainability. *Facilities, 34*(5/6), 264–288.
90. Zijlstra, E., Hagedoorn, M., Krijnen, W. P., van der Schans, C. P., & Mobach, M. P. (2016). Route complexity and simulated physical ageing negatively influence wayfinding. *Applied Ergonomics, 56*, 62–67.



The Center for Health Design:
Moving Healthcare Forward

The Center for Health Design advances best practices and empowers healthcare leaders with quality research that demonstrates the value of design to improve health outcomes, patient experience of care, and provider/staff satisfaction and performance.

Learn more at
www.healthdesign.org