

Patient Satisfaction: Glossary (variables, metrics and measurement methods)

	Term	Definition	Metrics	Measurement method
Environmental variable	Acoustic ceiling tile	Ceiling tiles that absorb sound reflected off hard surfaces and can be used in a grid or direct-glued to a solid ceiling deck. Typically porous, these products accept and trap sound/vibration and allow it to dissipate before leaving the products (ASI Pro Audio Acoustics, 2010).	- Yes/no, before/after - Noise Reduction Coefficient (NRC) - A measure for rating the overall sound-absorption performance of a material when used in an enclosed architectural space such as an office where sound is being reflected at many angles of incidence. Specifically, it is the 4 frequency averaged absorption coefficients @ 250, 500, 1000 and 2000 Hz, rounded to the nearest 0.05. A material with NRC < 0.50 is a poor absorber, and NRC > .80 is a very good absorber (Armstrong, 2010).	<b>Design manipulation</b> - First, sound-reflecting ceiling tiles (13 mm solid painted plaster board tiles) were installed. Four weeks later, the ceiling tiles were replaced with sound absorbing ceiling tiles (40 mm Ecophon high density resin bonded glass wool with a painted surface) of nearly identical appearance (Hagerman, et al., 2005)
	Acuity-adaptable room	Rooms designed with sufficient space and provision for equipment, medical gases, and power to accommodate any level of patient acuity (Evans, Pati, & Harvey, 2008).	- Yes/no, before/after (Hendrich, Fay, & Sorrells, 2004)	<b>Design manipulation</b> - The coronary critical care unit and medical step-down unit were redesigned and combined into one acuity-adaptable unit (Hendrich, Fay, & Sorrells, 2004).
	Amenities	Features of health services that do not relate directly to clinical effectiveness but may enhance the client's satisfaction and willingness to return (Brown, Franco, Rafeh, & Hatzell, 1998)	- Level of amenities: high level of amenities (windows, maple furniture, sofa chairs, soundproofing walls, private bathrooms) vs. low amenities (old, 'high-tech, low-touch', dark, small bathrooms) (Janssen, Klein, Harris, Soolsma, & Seymour, 2000), amenities such as décor and entertainment facilities appropriate for children (Judkins, 2003)	<b>Design manipulation</b> - New single-room maternity care unit with more amenities versus old rooms (Janssen et al., 2000); - New ED dedicated to pediatric patients with décor and entertainment appropriate for children (Judkins, 2003)

	Term	Definition	Metrics	Measurement method
	<b>Attractiveness, physical environment</b>	Aesthetic appeal of the physical environment, including the surrounding external environment, the architectural design, facility upkeep and cleanliness, and other physical elements (Becker & Douglass, 2008)	<ul style="list-style-type: none"> <li>- Physical environment attractiveness score (summation of ranks) (Becker &amp; Douglass, 2008)</li> <li>- Appealing room versus typical room (Swan et al., 2003)</li> </ul>	<p><b>Subjective rating</b></p> <ul style="list-style-type: none"> <li>- Four photos of each of six facilities were presented to six university graduate students in non-design majors. The students were asked to rank the environments from most attractive (6) to least attractive (1). The ratings from all students regarding one facility were summed to create an environmental attractiveness score with a higher score reflecting a more attractive environment (Becker &amp; Douglass, 2008).</li> </ul> <p><b>Design manipulation</b></p> <ul style="list-style-type: none"> <li>- Appealing, hotel-like rooms featured wood furniture, decorator art, carpeted floors, crown molding, and ceramic tile baths (Swan et al., 2003)</li> </ul>
	<b>Noise</b>	A sound that is loud, unpleasant, unexpected, or undesired (Free Dictionary)	<ul style="list-style-type: none"> <li>- Equivalent sound pressure level (LAeq) (constant noise level that would result in the same total sound energy being produced over a given period) (Hagerman et al., 2005)</li> <li>- Reverberation time (time needed for the sound pressure level to decrease by 60 dB) measured in central areas and two patient rooms in the unit (Hagerman et al., 2005)</li> </ul>	<p><b>Acoustic measurement</b></p> <ul style="list-style-type: none"> <li>- Acoustic measurement by a third-party company (Hagerman et al., 2005)</li> </ul>
	<b>Patient room occupancy</b>	The number of patients per patient room—one (single room, private room), two (double room), four (multi-bed open bays) (Nguyen Thi, Briancon, Empereur, & Guillemin, 2002; Soufi et al., 2010).	Single room versus 2 or 3 patients per room (Nguyen Thi, Briancon, Empereur, & Guillemin, 2002); Double room versus six-bed room (Soufi et al., 2010)	<p><b>Existing data from medical or administrative records</b></p> <ul style="list-style-type: none"> <li>- Health characteristics including admission room (double/common) were collected at admission (Soufi et al., 2010)</li> </ul>
	<b>Positive distractions</b>	A set of environmental features or conditions that have been found by research to effectively reduce stress. These features or conditions include nature and certain types of music, companion animals, laughter or comedy, and certain types of art (Ulrich, 1991).	- Yes/no, before/after (Diette et al., 2003; Lee et al., 2004)	<p><b>Design and experimental manipulation</b></p> <ul style="list-style-type: none"> <li>- 42x52 photographic quality mural of a mountain stream in a spring meadow, mounted from the ceiling at bedside so patients could view it supine, nature sounds played with a portable tape recorder (Diette et al., 2003)</li> <li>- Classical music and home-made movie (mainly scenic views) provided by an Eyetrek system (Olympus, Japan) (Lee et al., 2004)</li> </ul>

	Term	Definition	Metrics	Measurement method
Outcome	Anxiety	State anxiety: reflects a transitory emotional state or condition of the human organism that is characterized by subjective, consciously perceived feelings of tension and apprehension and heightened autonomic nervous system activity. Trait anxiety: denotes relatively stable individual differences in anxiety proneness; refers to a general tendency to respond with anxiety to perceived threats in the environment (Spielberger, Gorsuch, and Lushene, 1970)	- The Spielberger State-Trait Anxiety Inventory (S-STAI) score - the summation or average of items (Diette et al., 2003; Rice, Ingram, & Mizan, 2008; Routhieaux & Tansik, 1997)	<b>Questionnaire survey</b> - Six-item short version of the state anxiety measure (calm, tense, upset, relaxed, content, worried) from the Spielberger State-Trait Anxiety Inventory was included in a questionnaire completed by a patient twice - while waiting to begin the procedure and the second day following the procedure (Diette et al., 2003).
	Patient loyalty	Patient's long-term commitment to a preferred healthcare service provider; a manifestation of attitudes and actual purchasing behaviors (Hsu, Hsu, & Chiu, 2009)	Willingness to recommend or return, ratings of Likert scale (Nguyen Thi et al., 2002; Swan et al., 2003)	<b>Questionnaire survey</b> - Two questions in Patient Judgments of Hospital Quality questionnaire (PJHQ) about intention of recommending the hospital or returning (Nguyen Thi et al., 2002)
	Satisfaction, patient	Degree to which an individual regards a provider's health care service, product, or the manner in which the service or product is delivered as useful, effective, or beneficial (NLM MeSH).	- Scores of Likert type scales or subscales calculated (summation or average of items in the each scale/subscale) (e.g. Groff et al., 2008; Janssen et al., 2000; ) - % of "excellent" responses (Becker & Douglass, 2008) - % of patients who are dissatisfied (Hendrich, Fay & Sorrells, 2004) - Score of a single question of patient satisfaction (Leather et al., 2003; Lee et al., 2004)	<b>Questionnaire survey</b> - Questionnaires (8 subscales - e.g., information and support, being with family and friends, privacy needs, physical environment) were distributed on the day of delivery and completed after delivery and before discharge (Janssen et al., 2000). A questionnaire including 16 items from a patient judgment system (PJS) developed by the Hospital Corporation of America was distributed to patients before and after the movement to a new unit. Patients completed the questionnaires independently or with help from nurses. The completed questionnaires were collected by nurses (Kline et al., 2007) - Patients were offered a questionnaire survey when completing their clinic visits and asked to fill out a questionnaire on-site or mail in the completed questionnaire from home. The quality of care index was the average percentage of "excellent" responses to 4 questions related to care, services, and interactions with staff and doctors (Becker & Douglass, 2008) - Patient Expectation Project standardized tool (Arbor Associates, Inc., Potoskey, MI) measuring how closely patients' experiences meet their expectations (Hendrich, Fay & Sorrells, 2004) - Satisfaction score on a 10 cm visual analog scale (0 =not satisfied, 10 = very satisfied) (Lee et al., 2004)

Patient Satisfaction: Article Analysis

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Becker, F., & Douglass, S. (2008). The ecology of the patient visit: physical attractiveness, waiting times, and perceived quality of care. <i>Journal of Ambulatory Care Management</i> , 31 (2), 128-141.	Physical environment attractiveness	Physical environment attractiveness score (summation of ranks based on subjective ratings)	Patient perceived quality of care; Patient perceived staff interactions; Patient anxiety; Patient recommendation of facility; Patient perceived waiting time.	- Quality-of-care index: % of "excellent" responses to a question (patient questionnaire survey, 4 questions: The care I received here today was...; The service I received here today was...; Overall, my interactions with staff were...; Overall, my interactions with doctors were...); - Staff-interaction index; - Patient anxiety ("environment helped to ease my anxieties"); % of responses in the "top box" - Perceived waiting time (percentage of respondents in categories from 0-5 minutes to more than 30 minutes)	Correlational study; cross sectional	Higher ratings of environmental attractiveness were associated with more favorable perceptions of the quality of care, a higher percentage of anxiety reduction, higher ratings of staff interactions.	Six outpatient facilities in New York	Six graduate students, 205 outpatients
Chang, S-C., & Chen, C-H. (2005). Effects of music therapy on women's physiological measures, anxiety and satisfaction during Cesarean delivery. <i>Research in Nursing and Health</i> , 28 (6), 453-461.	Music	Three types of relaxing, anxiety-reducing music chosen by participants: Western classical, new age, or Chinese religious music.	Patient anxiety Patient physiological indexes Birth satisfaction	- The visual analogue scale for anxiety (VASA), consisting of a 10 cm horizontal line with the descriptors no anxiety at the left and worst possible anxiety at the right. The participants were asked to indicate how anxious they were feeling "right now" by marking the appropriate place on the line. - Pulse hemoglobin oxygen saturation (SpO2, NONIN MODEL 9500 pulse oximeter), temperature of the finger (Biofeedback System DT-002 thermometer), respiration rate, pulse rate, systolic blood pressure, and diastolic blood pressure (Hewlett Packard 78352A). - Satisfaction of cesarean delivery scale (SCDS), seven items (including the woman's perceived health status, the perceived health status of the baby, the maintenance of physical function, the maintenance of physical comfort, seeking safe passage for herself, ego orientation, and birth atmosphere), 5-point Likert scale, adequate content validity (CVI = .94) and internal consistency (Cronach's alpha = .86)	Experiment	Women in the music listening group had lower anxiety than their peers in the control group during the end of maternal contact with the neonate in the intraoperation period and after completion of the skin sutures. They also reported greater satisfaction with the cesarean experience.	A academic hospital in Taiwan	64 women having a cesarean delivery

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Diette, G. B., Lechtzin, N., Haponik, E., Devrotes, A., & Rubin, H. R. (2003). Distraction therapy with nature sights and sounds reduces pain during flexible bronchoscopy: A complementary approach to routine analgesia. <i>Chest</i> , 123 (3), 941-948.	Positive distractions (nature scene and sound)	Intervention (42x52 photographic quality mural of a mountain stream in a spring meadow, mounted from the ceiling at bedside so patients could view it in supine position, nature sounds played with a portable tape recorder) vs. control (no nature scene mural and nature sound) cared in the same unit	State anxiety; Pain control; Ability to breathe; Satisfaction with care	- State anxiety - six-item short version of the state of anxiety measure from the Spielberger State-Trait Anxiety Inventory (S-STAI), calm, tense, upset, relaxed, content, worried, 4-point scale, not at all to very much so; the summation of items were normalized to scores from 20 (low) to 80 (high); - Pain control - one question about how well pain was controlled during the procedure (poor to excellent), percentage of responses in 'very good' or 'excellent'; - Ability to breathe, percentage of responses in 'very good' or 'excellent'; - Satisfaction with care (willing to return, privacy, safety, overall rating), percentage of responses in 'definitely', or 'very good' or 'excellent'	Field experiment, patients on one certain day were assigned to intervention or control group	Patients who had access to nature murals and nature sounds at bedside reported better pain control after adjustment for demographics. Among indicators of patient satisfaction, privacy and the overall facility were more favorably rated by patients in the intervention group; however the differences were not significant.	Endoscopy suite in a teaching hospital in Baltimore, MD	80 patients undergoing flexible bronchoscopy (41 intervention, 39 control)
Groff, S. L., Carlson, L. E., Tsang, K., & Potter, B. J. (2008). Cancer patients' satisfaction with care in traditional and innovative ambulatory oncology clinics. <i>Journal of Nursing Care Quality</i> , 23 (3), 251-257.	Outpatient clinic environment (multiple factors)	New oncology clinic (separated waiting sub-areas, soothing music, viewing of nature scenes, warm wall colors, lighting, pagers to inform patients of their appointments, dedicated patient parking) vs. old clinic (one big room, "hospital like" colors, only one small TV, parking that was difficult to access)	Patient satisfaction	- Patient Satisfaction Questionnaire (PSQ-III), 43 items in 6 subscales (general satisfaction, technical quality, interpersonal care, communication, time spent with provider, access/availability/ convenience), each subscale was calculated on a 0-100 scale; - Additional 17 items in 6 domains (from other instruments and self-constructed): physical environment, wait times, continuity of care, confidentiality of information, trust in providers, interpersonal care)	Pre-post comparison with control group (three patient groups - one moved to a new clinic, the others stayed in the same clinic)	There were no significant differences between the three patient groups on the subscales before the move. After the lung cancer patients moved to the new clinic, patients in this group were more satisfied with the physical environment and wait time than those patients remained on the old clinic.	A academic cancer center in Canada	698 oncology outpatient with lung, head and neck, or gynecological tumor
Hagerman, I., Rasmanis, G., Blomkvist, V., Ulrich, R., Eriksen, C. A., & Theorell, T. (2005). Influence of intensive coronary care acoustics on the quality of care and physiological state of patients. <i>International Journal of Cardiology</i> , 98 (2), 267-270.	Ceiling tile type; Acoustics (noise level, reverberation time)	Ceiling tile - sound-reflecting (13-mm solid painted plaster board tiles) vs. sound absorbing (40-mm Ecophon high density resin bonded glass wool with a painted surface, class A); Equivalent sound pressure level (L <sub>Aeq</sub> ) and reverberation time measured in central areas and two patient rooms in the unit	Patient perceived quality of care; Blood pressure data (pulse amplitude, heart rate, heart rate variability); Short time prognosis	- Visual analogue scales with scores from 0 to 10, six questions (overall quality of care, staff attitude, waking due to sounds, intelligibility of what staff say, sounds from the corridor, disturbances due to sounds); - Blood pressure, pulse amplitude (mm Hg), heart rate (beats/min), heart rate variability (ms) assessed in supine position by an automatic device (MIDA, Ortivus Medical, Sweden); - Rehospitalization and mortality within 1 and 3 months (percentage)	Before-after, repeated measurements	Patients' satisfaction with overall quality of care and their ratings of staff attitude was better in the sound absorbing ceiling tile condition. Patients reported that they overheard sounds from the corridor and wake up due to sounds more often in the sound reflecting ceiling tile condition. Higher rate of Rehospitalization was found in the groups of patients hospitalized during the period of sound reflecting ceiling tiles. In patients with acute myocardial infarction and unstable angina pectoris, lower values in pulse amplitude were found in the sound absorbing ceiling tile condition.	A intensive coronary heart unit in Sweden	94 patients

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Harris, D., Shepley, M. M., & White, R. (2006). <i>The impact of single family NICU rooms</i> . San Francisco, CA: Coalition for Health Environments Research	Patient room occupancy type	Single family room vs. open bay (two types in a NICU)	Parent satisfaction with the physical environment; Parent perception of the physical environment; Parent perceived stress	- Degree of satisfaction with the physical environment, 10 questions, 5-point scale, average score (overall physical environment, windows views, natural light, light level, noise level, atmosphere and decor, waiting and resting space, corridors and signage for wayfinding, place for food and nourishment) - Level of agreement with statement regarding the physical environment, 12 questions, 5-point scale, average score (e.g. quiet, private space for family to be alone) - Three subscales of Parental Stress Scale: Neonatal Intensive Care Unit - sights and sounds, parent role, staff behaviors and communication, 5-point scale, average score	Comparison between two types of beds in one NICU	Descriptive analysis showed that parents in single rooms seemed to be more satisfied with the physical environment. The biggest difference was with regard to window views and place to sleep near infants. Parents felt less stressful and depressing in single rooms than in open bays.	A level III NICU in US	21 respondents (16 parents in single rooms, 5 in open bays)
Harris, P. B. (2002). A place to heal: Environmental sources of satisfaction among hospital patients. <i>Journal of Applied Social Psychology, 32</i> (6), 1276-99	Patient satisfaction with physical environment	Modified Patient Perceptions of Quality Interview-Inpatient Form (PPQ-I) facilities scale (3 items, overall quality of room, environment outside of room, cleanliness of room)	Patient overall satisfaction Patient satisfaction with individual aspects of patient care (e.g. nursing, physician, clinical quality)	- PPQ-I, 15 items, overall satisfaction (1 item), six aspects of service quality (10 items, nursing care, physician care, admitting, discharge, food, housekeeping), clinical quality (4 items). - Modified PPQ-I. 4 subscales, nursing scale and physician scale (3 items each, information provided, caring and concern, professional skill), clinical scale (4 items, condition improved, staff tried to improve condition, tests and treatment appropriate, staff tried to alleviate pain), facilities scale (3 items, overall quality of room, environment outside of room,	Correlational study	Patient satisfaction with the physical environment was a significant predictor of patient overall satisfaction with healthcare, although not as strong a predictor as nursing care and clinical quality. Sources of satisfaction with the environment includes equipment (TV), furniture (bed), finishes (wall finishes), color and decor (artwork), plan and layout of the room (accessibility).	Six hospitals in one system: 2 small, 2 mid-sized, 2 large	380 inpatients
Hendrich, A. L., Fay, J., & Sorrells, A. K. (2004). Effects of acuity-adaptable rooms on flow of patients and delivery of care. <i>American Journal of Critical Care, 13</i> (1), 35-45.	Acuity-adaptable room	Renovation of nursing unit by combining two separate units (critical care unit and step-down unit) into one acuity adaptable unit	Patient dissatisfaction	- Patient Expectation Project standardized tool (Arbor Associates, Inc., Potoskey, MI) measuring how closely patients' experiences meet their expectations and key factors that predict patient overall willingness to choose the hospital again or to recommend it to family and friends, measured by the percentage of patients who are dissatisfied (e.g. not made to feel less nervous or withdrawn, not treated with respect and dignity, nurses not friendly and caring)	Before-after study, comparison of data collected before/after the renovation of nursing unit	Patients' level of dissatisfaction decreased significantly in various predictive indicators. Patient's overall dissatisfaction rate decreased from 6% to 3% in the three years after the move.	Coronary care unit (critical and progressive care)	2 years of data before renovation and 3 years of data after

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Janssen, P. A., Klein, M. C., Harris, S. J., Soolsma, J., & Seymour, L. C. (2000). Single room maternity care and client satisfaction. <i>Birth, 27</i> (4), 235-243.	Maternity room design (function, size, amenities)	LDRP rooms (new spacious single rooms, windows, maple furniture, sofa chairs, soundproofing walls, and private bathrooms) vs. separate delivery and postpartum rooms (old, combination of double-occupancy and single rooms, 'high tech, low touch', dark, small bathrooms)	Patient satisfaction	- Satisfaction in 8 areas: information and support, being with family and friends, privacy needs, physical environment, nursing care, teaching, feeding baby, discharge planning; a scale of 1-5, 1 very dissatisfied, 5 very satisfied); surveys distributed on the day of delivery and completed after delivery and before discharge, average scores.	Pre-post & concurrent comparison; one intervention group, two comparison group	Patients in single room maternity care rooms were more satisfied in all the eight areas measured by the questionnaire survey (including the following aspects of the physical environment: spacious and adequate, able to find supplies, support person was comfortable, lighting, privacy).	Maternity care unit in an obstetric hospital in Canada	205 patients in single room maternity care unit, 221 similar patients in traditional rooms before the single room maternity care unit was opened, and 104 patients in traditional rooms when the single room maternity care unit was in use.
Judkins S. (2003). Paediatric emergency department design: Does it affect staff, patient and community satisfaction? <i>Emergency Medicine, 15</i> (1), 63-67.	ED design	ED waiting and treatment areas dedicated to pediatrics, physical separation between pediatrics and adult ED, décor and entertainment facilities appropriate for children	Patient/family, staff, physician satisfaction	- Questionnaire (individualized, 6 questions for patient/family), 5 point rating from 1 poor to 5 excellent, number and percentage of responses in each category	Before-after comparison (the month before and 6 moth after the move)	Patients' families in the new dedicated pediatric ED had more positive perceptions of the physical environment and were more satisfied with the overall management of the children.	A major metropolitan teaching hospital in Australia	93 patients' families
Kline, T. J., Baylis, B. W., Chatur, F., Morrison, S. A., White, D. E., Flin, R. H., & Ghali, W.A. (2007). Patient satisfaction: Evaluating the success of hospital ward redesign. <i>Journal of Healthcare Quality, 29</i> (3), 44-49.	Nursing unit design	New ward (predominance of private rooms, spacious areas for families and visitors, unique infection control design features, abundance of computer terminals for staff, wireless communication) vs. traditional ward lacking the above features	Patient satisfaction	- 16 items from a patient judgment system (PJS) developed by the Hospital Corporation of America (95 items in the original survey) - patients' immediate physical environment (4 items), general hospital environment (5 items), staff-patient interactions (3 items), overall satisfaction (4 items). 5-point and 4-point scales, composite scores were the sum of the item scores	Before-after comparison, correlational analysis	The new ward was rated significantly higher in all items of immediate physical environment and overall satisfaction, and one item in general hospital quality (medical facilities). The composite scores of immediate physical environment, general hospital environment, and staff interactions were positively associated with the score of overall satisfaction.	A 36-bed tertiary care medical ward in a 750-bed teaching hospital in Calgary, Alberta, Canada	21 patients who completed both pre- and post-move surveys
Ko, H. H., Zhang, H., Telford, J. J., & Enns, R. (2009). Factors influencing patient satisfaction when undergoing endoscopic procedures. <i>Gastrointestinal Endoscopy, 69</i> (4), 883-891.	Perception of the physical environment	Questionnaire - One question: How would you rate the physical environment of the exam room (cleanliness, privacy, noise level)? 5 point, poor-excellent	Patient satisfaction with endoscopy	American Society for Gastrointestinal Endoscopy modified Group Health Association of America patient satisfaction survey (mGHAA-9), 9 items, 6 aspects of endoscopic experiences: waiting time for an appointment, waiting time before procedure, personal manner (courtesy respect, sensitivity, and friendliness) of the physician, personal manner of nurses and supporting staff, technical skills (thoroughness, carefulness, competence) of physician, adequacy of explanation of the procedure; 3 questions, overall rating of the visit (5 point, very satisfied to very dissatisfied, converted to two groups-- "very satisfied" and "not very satisfied"), whether the patient would have the procedure done by the same physician or at the same facility (yes/no)	Correlational study	Factors contributing to patient satisfaction with endoscopy included personal manner of endoscopists and nurses, perception of endoscopist's technical skill, environment of the endoscopy unit, and longer time spent with physician explaining the procedure.	A tertiary academic hospital	261 patients undergoing endoscopic procedures

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Krueckeberg, H. F., & Hubbert, A. (1995). Attribute correlates of hospital outpatient satisfaction. <i>Journal of Ambulatory Care Marketing</i> , 6 (1), 11-43.	Facility attributes	Facility attributes as rated by patients using a questionnaire format (e.g. cleanliness, attractiveness, comfort)	Patient satisfaction	- Self expressed appraisal (one question, 5-point Likert Scale); - Calculated appraisal (weighted average of 75 individual hypothesized predictors on a 5 point scale in six categories (access, facility, process/systems, communication, instrumental cure, affective care), average scores	Correlational study using regression analysis	Facility attributes (cleanliness, attractiveness, comfort) were significant predictors of the variation in outpatient satisfaction. Five of eight facility attributes (e.g. comfort, convenience, attractiveness, lighting, equipment) were rated lower than average.	An acute care community hospital	474 outpatients who recently visited the departments of radiology, laboratory, cardio-respiratory therapy
Leather, P., Beale, D., Santos, A., Watts, J., & Lee, L. (2003). Outcomes of environmental appraisal of different hospital waiting areas. <i>Environment &amp; Behavior</i> , 35 (6), 842-869.	Waiting room environment	New design with healing features (wooden chairs, nature photography, indoor plants, open-plan reception area, no files or paperwork visible from waiting area, etc.) vs. traditional design (plastic-covered chairs, small dried flower arrangement, enclosed reception area, files and paperwork visible from waiting area, etc.)	Patient satisfaction with the room environment; Patient's affective appraisals; Self-reported stress and arousal; Pulse rate	- Patient satisfaction ratings on a 7-point scale, single item (interview); - Fisher's (1974) Perceived Environmental Quality Index (PEQI), 14 seven-point scales; - Cox and Mackay's (1985) Stress Arousal Checklist (SCAL), 12 items related to stress, 8 items related to arousal, each item scored as 0/1 based on presence/absence of feelings, scale score was the sum of all items; - Pleasantness of ten specific design features rated on 7-point scale; - # of heart beats per minute (digital exercise pulse monitor[Elexis Pulse Coach 3] via clip on earlobe)	Before-after study, independent groups	The new waiting room with healing features demonstrated higher self-reported satisfaction with the environment, more positive affective appraisals, and improved stress and arousal level.	A neurology outpatient clinic in UK	145 neurology outpatients
Lee, D. W., Chan, A. C., Wong, S. K., Fung, T. M., Li, A. C., Chan, S. K., ...Chung, S.C. (2004). Can visual distraction decrease the dose of patient controlled sedation required during colonoscopy? A prospective randomized controlled trial. <i>Endoscopy</i> , 36 (3), 197-201.	Audio/visual distractions	Audio distraction - classical music; Visual distraction - home-made movie (mainly scenic views) provided by an Eyetrek system (Olympus, Japan)	Sedation use; Complications; Recovery time; Pain score; Satisfaction score; Willingness to use the sedation mode again	Doses of patient controlled propofol and alfentanil used (mg/Kg); Episodes of hypotension (systolic blood pressure <90 mm Hg) and oxygen desaturation (SaO2 <90%); Recovery time (patients assessed every 5 minutes until patient was orientated to time, place, and person and was able to serially subtract 7 from 100; Pain score (10 cm visual analog scale, 0 =no pain, 10 = very painful); Satisfaction score (10 cm visual analog scale, 0 =not satisfied, 10 = very satisfied); Willingness to repeat the same mode of sedation (immediately and 24 hours after, number of patients)	Randomized controlled trial, comparison of three conditions: - visual distraction; - visual and audio distraction - no distraction	Patients who had access to the visual or audiovisual distractions were more satisfied and were more willing to use the same mode of sedation again. Patients in the audiovisual group used lower doses of propofol than other two groups.	A hospital in Hong Kong	165 patients undergoing elective colonoscopy

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Lee, D.W.H., Chan, K.W., Poon, C.M., Ko, C.W., Chan, K.H., Sin, K.S....Chan, A.C. (2002). <b>Relaxation music decreases the dose of patient-controlled sedation during colonoscopy: A prospective randomized controlled trial. <i>Gastrointestinal Endoscopy</i>, 55 (1), 33-36</b>	Music	Music: music (classical, jazz, popular, Chinese opera) provided by a portable player with headphones and controlled by patients;	Sedation use; Complications; Recovery time; Pain; Satisfaction; Willingness to use the sedation mode again	- Doses of patient controlled propofol used (mg/Kg), - Episodes of hypotension (systolic blood pressure <90 mm Hg)and oxygen desaturation (SaO <sub>2</sub> <90%), - Recovery time (patients assessed every 5 minutes until patient was orientated to time, place, and person and was able to serially subtract 7 from 100; - Pain score (10 cm visual analog scale, 0 =no pain, 10 = very painful); - Satisfaction score (10 cm visual analog scale, 0 =not satisfied, 10 = very satisfied); - Willingness to repeat the same mode of sedation (immediately and 24 hours after, number of patients)	Randomized controlled trial, comparison of three conditions: - patient-controlled sedation (PCS) and music - PCS only - music only	Patients in condition 1 (PCS + music) used significantly lower dose of sedation and were more satisfied than patients in condition 2 (PCS only). PCS + music was the best-accepted sedation mode.	A hospital in Hong Kong	165 outpatients undergoing elective colonoscopy
Nguyen Thi, P. L., Briancon, S., Empereur, F., & Guillemin, F. (2002). <b>Factors determining inpatient satisfaction with care. <i>Social Science &amp; Medicine</i>, 54 (4), 493-504.</b>	Sociodemographics Health characteristics Hospital stay characteristics Unit characteristics	Sociodemographics (age, education, family situation, sex, living alone, occupational activity, distance from home to hospital, community size) Health characteristics (body mass index, Karnofsky index, assistance needed at hospital, self-perceived health status in 6 dimensions - physical functioning, bodily pain, general health perception, vitality, social functioning, mental health [SF-36 Health Profile Questionnaire]) Hospital stay characteristics (prior hospitalization, hospital choice, type of service, specialty, # of patients in a room [1 vs. 2,3], length of stay, time between discharge and completion of survey) Unit characteristics (# of inpatients, mean length of stay, # of physicians and nurses, index of care load - # of inpatients per physician/nurse per year [from administration data])	Patient satisfaction	- Patient Judgments of Hospital Quality questionnaire (PJHQ): 8 questions of explanatory variables (# of prior hospitalization, prior consultations, choice of hospital, # of beds in room, self reported condition at admission, need for assistance); 36 questions covering 5 hospital practices - admission (4), nursing and daily care (10), medical care (4), information (6), hospital environment and ancillary staff (12); 2 questions about overall satisfaction; 2 questions about intention of recommending the hospital or returning; 1 open-ended question for comments/suggestions; 5-point Likert scale, mean scores used in regression analysis	Correlational, regression analysis	Patients in private rooms reported higher satisfaction level in the following dimensions: admissions, hospital environment and ancillary staff, information, overall quality of care, recommendations/intentions. Older age and better self-perceived health status were two strongest predictors of satisfaction in all dimensions. Other predictors included family status, Karnofsky index, self-perceived condition at admission, choice of hospital, length of stay.	12 medical and surgical services in a public hospital in northern France	533 inpatients
Potthoff, J. K. (1995). <b>Adolescent satisfaction with drug/alcohol treatment facilities: Design implications. <i>Journal of Alcohol and Drug Education</i>, 41 (1), 62-73</b>	Aesthetics/overall atmosphere	Two facilities (A, B) were renovated dormitories, institutional character, lack of comfort, mismatch of furnishings, absence of items making a place feel like home. One facility (C) designed for adolescent care , quality furnishings and finishes of light colored woods, jeweled-tined upholstery wall-to-wall carpeting, framed prints and artwork	Patient satisfaction with interior space	Questionnaire - Questions including pieces of furniture most used, most liked and disliked places to be, what the patient most missed from home. Daily record chart - Brief notations of where the patient spent the time and how the patient was comfortable in the space.	Concurrent comparison	Patients in facility C were more satisfied with the interior space. 95% and 90% of patients in facilities A & B requested changes in their bedrooms. 60% of patients in facility C did not request changes in the bed room.	Three inpatient drug and alcohol rehabilitation treatment facilities in Midwest	41 adolescent patients (33 male, 8 female)

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Rice, G., Ingram, J., & Mizan, J. (2008). <b>Enhancing a primary care environment: A case study of effects on patients and staff in a single general practice.</b> <i>British Journal of General Practice</i> , 58 (552), 465-470.	Primary care facility	Purpose-built facility vs. converted Victorian house (the old building was cramped and noisy, lacked privacy, had basic level of comfort and decoration; the new building was more spacious, had more light, more mordent appearance, and greater comfort and novel art works)	Patient satisfaction with waiting room and consultation room; Patient satisfaction with doctor communication; Patient anxiety;	- Patient satisfaction score, 5-point scale (summation of 9 items for waiting room and 6 items for consultation room); - Doctor satisfaction, 7-point scale (summation of 6 items); - Spielberger State-Trait Anxiety Inventory (STAI), 4-point scale (summation of 6 items).	Before and after comparison; repeated measurements	Patient satisfaction with the reception/waiting area and consultation rooms and satisfaction with doctor communication were higher in the new building. Lower patient anxiety was found in the new building.	An urban primary care facility in UK	1118 pre-move and 954 post-move patients;
Routhieaux, R. L., & Tansik, D. A. (1997). <b>The benefits of music in hospital waiting rooms.</b> <i>Health Care Supervisor</i> , 16(2), 31-40.	Music	A seven-disc compact disc player, an amplifier, and a speaker system. Low relaxing music (tempo between 60 and 80 beats per minute)	Waiting room visitor stress and perception of service quality	- A questionnaire including self-reported measures of visitor stress levels - average stress measure (anxious, nervous, tense) and average relaxation measure (at ease, calm) based on Spielberger State Anxiety Measure, 5-point scale from not at all to extremely, average scores; - Perceptions of customer service - overall rating of customer service, extent to which hospital is meeting expectation	Interventional study, music was played in randomly selected weeks	Visitors were less stressed and more relaxed when the music was played. Respondents with higher relaxation measure scores rated the service more favorably than respondents with low relaxation measure scores.	A large hospital in southwestern U.S.	297 visitors in the waiting room who were waiting for persons undergoing surgery (162 for the music condition, 135 for the no music condition)
Schmock, B. N. (2009). <b>Effect of sacred space environment on surgical patient outcomes: A pilot study.</b> <i>International Journal for Human Caring</i> , 13 (1), 49-59.	Aesthetics	Sacred environment, a caring-healing environment--dimmed lights with only peripheral lighting, selective music for surgical patients. Room temperature between 68F and 75F, warm blankets, and an art mural with soothing colors of nature	Patient evaluation of physical environment Patient perceived nursing care behavior Patient satisfaction	Questionnaire (Sacred Space Assessment Instrument [SSAI]) - Sacred Space Evaluation (SSE) score, summation of 18 items, 6 point scale, 1 strongly disagree to 6 strongly agree. - Caring Behavior Inventory (CBI-5), summation of 5 items from Adult Primary Care practices CBI-5, 6 point scale (never, almost never, occasionally, usually, almost always, always) - Satisfaction, summation of two items , 6 point scale, 1 strongly disagree, 6 strongly agree.	Concurrent comparison, post-test only design with a comparison group	Patients in the sacred environment reported more positive perception of the environment and the nursing care. But the difference in patient satisfaction was not statistically significant.	ORs in gynecologic oncology and genitourinary services in a community hospital	100 adult surgical patients
Scotto, C.J, McClusky, C., Spillan, S., & Kimmel, J. (2009). <b>Earplugs improve patients' subjective experience of sleep in critical.</b> <i>Nursing in Critical Care</i> , 14 (4), 180-4.	Earplug	Intervention group (used earplugs during regular night-time sleeping hours for one night) vs. control group	Patient satisfaction with sleep	- Verran--Snyder-Halpern Sleep Scale (8-item visual analogue instrument, Did not wake...woke off and on; Did not move...tossed all night; No sleep...10 h of sleep; Dissatisfied with amount of sleep...satisfied with amount of sleep; Did not fall a sleep at all;;fell asleep immediately; Dissatisfied with amount of time needed to fall asleep...satisfied with amount of time needed to fall asleep; Slept lightly...slept deeply; Awoke exhausted...awoke refreshed), administrated before noon on the day following the intervention, scored from 0 to 100, summation of scores	Quasi-experimental intervention study with random assignment of subjects	Total sleep satisfaction score was significantly better for patients in the intervention group who used earplugs to reduce disturbances of noise. The intervention group reported higher ratings on all 8 items (statistically significant difference on 7 items).	Two critical care units of a Midwestern teaching hospital	88 non-ventilated, non sedated adult patients (49 intervention / 39 control)

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
<b>Smykowski, L. (2008). A novel PACU design for noise reduction. <i>Journal of Perianesthesia Nursing</i>, 23 (4), 226-229.</b>	Patient care unit design	New design (separated pods of four patient bays; dedicated work station in each pod; wireless communication device, intercom system; patient controlled lighting; windows; chair for families; television at each bed) vs. old open floor plan (noisy, limited privacy, no windows, harsh lighting, centralized nursing station)	Patient satisfaction with noise level	Press Ganey question regarding "noise level in and around room", rating from 1 very poor to 5 very good (converted to 0-100), average score	Before and after comparison	Patients and staff expressed complaints about the noise and lack of privacy in the old unit. After the new unit was open, patient satisfaction about noise level improved considerably (no statistical tests were described).	A 400-bed private hospital in New York City.	No detailed description
<b>Soufi, G., Belayachi, J., Himmich, S., Ahid, S., Soufi, M., Zekraoui, A., &amp; Abouqal, R. (2010). Patient satisfaction in an acute medicine department in Morocco. <i>BMC Health Services Research</i>, 10, 149.</b>	Patient room occupancy, Demographics, socioeconomics, health characteristics	Patient room occupancy (double [2 beds per room] vs. common [6 beds per room]) Other characteristics (age, gender, marital status, residence, distance from home to hospital, education level, monthly income, health insurance status, prior hospitalization, admission type, length of stay, perceived health status compared to admission & people of the same age, satisfaction with life) collected at admission and discharge	Patient satisfaction	Arabic version of EQS-H (an inpatient satisfaction questionnaire developed in France), two dimensions--quality of medical information (MI, 8 items) and relationship with staff and daily routine (RS, 8 items) collected by questionnaire interview at discharge, scores of dimensions were means of items	Correlational, regression analysis	The multivariate regression showed that higher patient satisfaction with medical information was associated with staying in double room (vs. common room), having over two prior hospitalization, longer length of stay, and better perceived health status compared to admission. Higher satisfaction in relationship with staff and daily routine was associated with longer length of stay, better perceived health status compared to admission, and satisfaction with life.	An acute medicine department in a university hospital in Morocco	214 patients (>18 yr old, length of stay at least 48 hrs)
<b>Swan, J. E., Richardson, L. D., &amp; Hutton, J. D. (2003). Do appealing hospital rooms increase patient evaluations of physicians, nurses, and hospital services? <i>Health Care Management Review</i>, 28 (3), 254.</b>	Patient room attractiveness	Appealing hotel-like rooms (wood furniture, decorator art, carpeted floors, crown molding, and ceramic tile baths) vs. typical rooms (metal beds, inexpensive chair, no artwork)	Patient satisfaction	Patient questionnaire (Patient Report Card [PRC]) including ten multi-item sub-scales: doctor index, nurse index, courtesy food service staff, courtesy housekeeping staff, food service satisfaction, received food ordered, food temperature, overall ratings about the hospital, intention to reuse hospital, intention to recommend hospital; rated on 5-point scale, scoring by averaging ratings of items .	Comparison of independent groups in different settings, patient groups matched on case mix, length of stay, etc.	Patients in appealing rooms were more satisfied with the hospital and more willing to reuse and recommend the hospital. Patients in appealing rooms also more positively rated attending physicians, housekeeping and food service staffs.	Two types of patient rooms in a hospital	177 patients (88 in typical rooms, 89 in appealing rooms)
<b>Thorgaard, P., Ertmann, E., Hansen, V., Noerregaard, A., Hansen, V., &amp; Spanggaard, L. (2005). Designed sound and music environment in postanesthesia care units - A multicentre study of patients and staff. <i>Intensive &amp; Critical Care Nursing</i>, 21 (4), 220-225.</b>	Music	Music played through ceiling-suspended loudspeakers; Patient perception of music sound environment (pleasant/unpleasant, 10-point scale);	Patient perceived degree of relaxation (0-9); Patient satisfaction with PACU stay (0-9); Staff perception of music sound environment (pleasantness, stress, level of sound, patient experience of music environment)	Patient opinions were collected by interview and were expressed qualitatively by choosing specified statements and quantitatively on a 10-point Likert scale, 0-the best thinkable, 9-the worst thinkable); Staff opinions were collected by anonymous questionnaire and expressed qualitatively.	Correlational study	The majority of patients perceived the sound environment to be pleasant. Patients' positive perceptions of the music environment was strongly related to high level of relaxation and positive views of PACU stay. Staff had equally positive attitude towards the music environment but their views varied significantly across different units.	Five postanesthesia care units in three Danish hospitals	325 patients and 91 staff members

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Vaaler, A. E., Morken, G., & Linaker, O. M. (2005). Effects of different interior decorations in the seclusion area of a psychiatric acute ward. <i>Nordic Journal of Psychiatry</i> , 59(1), 19-24.	Interior design	- Traditional interior design and furniture Sparse furniture, walls in grey colors, lacking pictures, no window curtains, single lamps in the ceiling 4 m high, bathroom with grey, laminated paint all over, and patient rooms with a single bed and a chair of metal tubes. - New unit that looks similar to ordinary Norwegian homes. Wainscoting on walls, colorful wallpaper and paintings; lowered ceilings and multiple lighting spots, tasteful windows curtains; wardrobes, chairs, flowers and personal items in the patient rooms; Italian ceramic tile covering the entire bathroom.	Patient satisfaction Patient symptoms, general psychopathology, function and behavior	An eight-item visual analogue scale with scores 0 -10 Positive and Negative Syndrome Scale (PANSS) for schizophrenia (17) Global Assessment Scale Split version (GAF-S), a two-item scale measuring global symptoms and functioning Brøset Violence Checklist, a six-item observer-rated scale scoring behaviors that predict imminent violence in psychiatric inpatients Staff Observation Aggression Scale-Revised (SOAS-R), measuring violent or threatening incidents	Concurrent comparison, quasi-experiment	Female patients were more satisfied with the interior of the new unit. There was no significant differences in satisfaction ratings in male patients.	The seclusion area of a psychiatric acute ward in Norway	56 consecutive patients admitted to the ward
Varni, J., Burwinkle, T., Dickinson, P., Sherman, S., Dixon, P., Ervice, J.,...Sadler, B.L. (2004). Evaluation of the build environment at a children's convalescent hospital: Development of the Pediatric Quality of Life Inventory parent and staff satisfaction measure for pediatric health care facilities. <i>Journal of Developmental and Behavioral Pediatrics</i> , 25(1), 10-20.	Parent and staff satisfaction with physical environment	Pediatric Quality of Life Inventory (PedQL) Built Environment Parent Module - two scales, 18 items: structure (14 items), facility aesthetics (4 items), answer keys from 0 "never happy" to 4 "always happy" converted to 0-100; scale score was the average of the items in the scale	Staff satisfaction with coworker relationship	PedQL Health Care Satisfaction Parent Module - 7 scales, 30 items: information (6 items), inclusion of family (4 items), technical skill (3 items), services (3 items), communication (7 items), emotional needs (4 items), overall satisfaction ( 3 items), answer keys from 0 "never happy" to 4 "always happy" converted to 0-100; scale score was the average of the items in the scale	Correlational study	Parents were not satisfied with the existing 30-year-old facility. Higher parent satisfaction with the built environment structure and aesthetics was associated with higher parent satisfaction with healthcare services.	A 30-year-old, 59-bed, long-term, skilled nursing facility dedicated to the care of medically fragile children with complex chronic conditions	40 parents of pediatric patients

Matrix of relationships

		Outcome	
	Variable	Patient satisfaction	Patient loyalty
Environmental feature	Physical environment attractiveness		
	Positive distractions		
	Noise		
	Acoustic ceiling tile		
	Patient room occupancy		
	Acuity-adaptable room		
	Amenities		

 Note: Cells shaded in gray indicate the existence of evidence supporting relationships between environmental features and outcomes