



Primary Care Exam Room Annotation

Design Elements, Related Outcomes, and Design Strategies

Design Element:	Desirable Outcome:	Design Strategies:	Reference:	
Layout-Overall	Reduced patient stress/anxiety and improved satisfaction	Separate patient and provider flows (e.g., one exam room with two doors, each accessible from patient area and staff area respectively) so that the back-stage staff work is not exposed to patients.		
	Enhanced communication/interaction	Large room size to accommodate big family visits or visits requiring the presence of interpreters.		
	Enhanced privacy	The location and orientation of the exam table and room door designed to minimize the possibility of the patient accidentally being viewed by patients and staff outside the room.		
	Reduced risk of contamination/infection	Special isolation rooms designated for patients who are or may be infectious.		
	Improved work efficiency and patient flow		Consultation/talking rooms interspersed with exam rooms for patient visits when disrobing is not required.	Henritze, Brammell, & McGloin, 1992
			Large rooms to accommodate group visits and education (for chronic disorders, pregnancy, diabetes, smoking cessation, family planning, etc.).	
			Universal rooms or one-stop care rooms that accommodate a wide variety of care activities (e.g., registration, blood draw, checkout) to reduce patient movement.	
	Improved access/wayfinding		Exam room layout that facilitates physical exam and other procedures (e.g., exam table angled away from walls, physician at patient's right side, physician's easy access to diagnostic instruments).	Kildea-Pahl, Baltimore, & Kosiara, 2001
			Standardized exam/consultation room layout (e.g., standardization of supplies stocked, same-handed rooms).	
Change-readiness/future-proofing		Sufficient clearance (e.g., wide corridors) for wheelchair use.		
		Use of easy-to-reconfigure/roll-away modular furniture and partitions to allow for multipurpose functions.		
Layout-Staff Zone	Improved work efficiency and patient flow	Building design that facilitates the potential changes in functional space layout (e.g., structural column location, modular layout, window modules).		
		Convenient locations of medications, supplies, and medical equipment to minimize unnecessary travel by nurses and staff.		
Layout-Patient Zone	Enhanced communication/interaction	Easy-to-access electrical outlets for using/charging equipment, diagnostic instruments, and portable devices.	Okken, van Rompay, & Pruy, 2012	
		Consultation rooms (if included) designed to support patient-provider conversation (e.g., deemphasizing exam tables and medical instruments for stress reduction, spaciousness).		
		Furniture layout that allows patient and staff equal access to the computer screen with minimal height differential between patient and provider to maintain good eye contact.	Almquist, Kelly, Bromberg, Bryant, Christianson, & Montori, 2009; Ajiboye, Dong, Moore, Kallail, & Baughman, 2015; Frankel et al., 2005; Rouf, Chumley, & Dobbie, 2008	



Design Element:	Desirable Outcome:	Design Strategies:	Reference:
Layout-Patient Zone	Enhanced privacy	Screened dressing spaces with lockable storage for personal items.	
Layout-Family Zone	Reduced patient stress/ anxiety and improved satisfaction	Sufficient seating for individuals, including families and/or interpreters who may accompany the patient.	
Flooring	Reduced patient stress/ anxiety and improved satisfaction	High-quality home-like or natural materials that create an attractive non-institutional ambience for patients and families.	Becker & Douglass, 2008; Becker, Sweeney, & Parsons, 2008; Pruyn & Smidts, 1998
	Reduced risk of contamination/infection	Easy-to clean or antibacterial/antimicrobial finish materials to reduce surface contamination. Smooth surfaces, with minimum perforations and crevices.	
	Improved access/ wayfinding	Color coding (e.g., floor, wall color, etc.), together with lighting, landmarks, and views of exterior, to make wayfinding easier for patients.	Baskaya, Wilson, & Özcan, 2004
	A healthy environment (reduced negative health effects)	Interior materials that contain low-VOC or minimized use of hazardous content (e.g., phthalates).	Ait Bamai et al., 2014; Bornehag et al., 2005; Jaakkola et al., 1999; Jaakkola, Ieromnimon, & Jaakkola, 2006; Ohlmeyer, Makowski, Fried, Hasch, & Schöler, 2008
		Interior materials that require less harsh chemicals than typical materials during installation, cleaning, maintenance, and replacement.	Delclos et al., 2007; Weaver, McDiarmid, Guidera, Humphrey, & Schaefer, 1993
Increased recycling	Interior materials that contain rapidly renewable materials (e.g., bamboo flooring, straw & wheat board, cotton batt insulation, etc.) or recycled content when possible.		
Wall	Reduced patient stress/ anxiety and improved satisfaction	High-quality home-like or natural materials that create an attractive non-institutional ambience for patients and families.	Becker & Douglass, 2008; Becker, Sweeney, & Parsons, 2008; Pruyn & Smidts, 1998
		Clock displayed in direct view of patients.	
		Display of expected waiting time in direct view of most patients.	
		Mirror for patients to check clothes before leaving the room.	
	Enhanced communication/ interaction	Nature scene artworks created by local artists or other pleasant stimuli visible for patients.	Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003; Lee et al., 2004; Pati & Nanda, 2011
		Neutral color background wall for video-conferencing without busy patterns or direct light reflections.	
	Enhanced patient sense of control	Electric and data outlets located conveniently close to the telemedicine equipment so that there is no visible clutter of electrical cables.	
		Controls of air-conditioning temperature, window blinds, and music so that they are adjustable by most patients.	
		Controls of air-conditioning temperature, window blinds, and music placed within reach of most patients.	
	Enhanced privacy	Controls of air-conditioning temperature, window blinds, and music so that are easy and intuitive to be used by patients.	
Solid walls (e.g., full-height partitions, materials with high noise reduction ratings - noise reduction coefficient (NRC), sound transmission class (STC), ceiling attenuation class (CAC)) that sufficiently prevent conversations in one room from being overheard by patients in neighboring rooms/corridors.		Deshefy-Longhi, Dixon, Olsen, & Grey, 2004	
Potential acoustic "holes" (e.g., receptacle boxes at same location on both sides of a partition wall) are minimized.			
	Solid walls preventing patients in rooms from being seen from outside the rooms.		



Design Element:	Desirable Outcome:	Design Strategies:	Reference:
Wall	Increased patient healthy behaviors	Visible and salient motivational signs/educational materials promoting physical activity.	Gillian, Blanken, Greiner, & Chumley, 2008; Kildea-Pahl, Baltimore, & Kosiara, 2001; Tivorsak, Britto, Klostermann, Nebrig, & Slap, 2004
		Age-appropriate artwork, TV broadcasts, brochures, and other visual displays of health education materials that include healthy lifestyles, healthy food, etc.	
	Reduced risk of contamination/infection	Easy-to-clean or antibacterial/antimicrobial finish materials to reduce surface contamination.	Williams, Singh, & Romberg, 2003
		Smooth surfaces, with minimal perforations and crevices. Minimal horizontal surfaces, ridges, reveals, or seams that could serve as dust collectors.	
	Improved work efficiency and patient flow	Sharps containers located within arm's reach and below eye level at point of use. (Use anthropometric charts.)	
	Improved access/wayfinding	Color coding (e.g., floor, wall color, etc.), together with lighting, landmarks, and view of exterior, to make wayfinding easy for patients.	Baskaya, Wilson, & Özcan, 2004
		Handrails that support frail, obese, and other patients when needed.	
A healthy environment (reduced negative health effects)	Interior materials that contain low-VOC or minimized use of hazardous content (e.g., phthalates).	Ait Bamai et al., 2014; Bornehag et al., 2005; Jaakkola et al., 1999; Jaakkola, Ieromnimon, & Jaakkola, 2006; Ohlmeyer, Makowski, Fried, Hasch, & Schöler, 2008	
	Interior materials that require less harsh chemicals than typical materials during installation, cleaning, maintenance, and replacement.	Delclos et al., 2007; Weaver, McDiarmid, Guidera, Humphrey, & Schaefer, 1993	
Increased recycling	Utilization of rapidly renewable interior materials (e.g., bamboo flooring, straw & wheat board, cotton batt insulation, etc.) or that contain recycled content when possible.		
Ceiling	Reduced patient stress/anxiety and improved satisfaction	Sound-absorbing ceiling tiles and other noise reduction measures.	
		High-quality home-like or natural materials to create an attractive non-institutional ambience for patients and families.	
	Enhanced communication/interaction	Sound-absorbing ceiling tiles to reduce noise and reverberation to minimize potential interference with verbal communication.	
	A healthy environment (reduced negative health effects)	Interior materials that contain low-VOC or minimal use of hazardous content (e.g., phthalates).	Ait Bamai et al., 2014; Bornehag et al., 2005; Jaakkola et al., 1999; Jaakkola, Ieromnimon, & Jaakkola, 2006; Ohlmeyer, Makowski, Fried, Hasch, & Schöler, 2008
Interior materials that require less harsh chemicals than typical materials during installation, cleaning, maintenance, and replacement.		Delclos et al., 2007; Weaver, McDiarmid, Guidera, Humphrey, & Schaefer, 1993	
Increased recycling	Interior materials that contain rapidly renewable materials (e.g., bamboo flooring, straw & wheat board, cotton batt insulation, etc.) or recycled content when possible.		
Window	Reduced patient stress/anxiety and improved satisfaction	Windows and/or skylights to provide plenty of direct or indirect natural light.	Rice, Ingram, & Mizan, 2008
		Views of outside nature/gardens.	Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003; Lee et al., 2004; Pati & Nanda, 2011
	Enhanced privacy	Window design elements (e.g., blinds, sill height) to ensure patient privacy.	
		Minimal placement of potential acoustic "holes" (e.g., gaps between window mullions and partition walls).	
Improved work efficiency and patient flow	Window glazing to facilitate skin color assessment (e.g., no bronze or green color).		



Design Element:	Desirable Outcome:	Design Strategies:	Reference:	
Window	Improved access/wayfinding	Natural light, views of outside, and landmarks to provide visual aids for wayfinding.		
	A healthy environment (reduced negative health effects)	Glazed windows with UV protection to reduce staff and patient UV exposure.		
	Reduced resource consumption		Proper shading (interior, integral, and exterior shading devices) to minimize direct sunlight and solar exposure in the main indoor spaces.	Oregon Health & Science University, 2007
			Light shelves to maximize daylight penetration so that electricity for artificial lighting is reduced.	
			Window sealant to minimize air leakage and reduce heating and cooling needs.	
			Window insulation to reduce heat transmission.	
	Glazed windows with high visual transmittance to maximize daylight penetration in the building without significantly increasing heat transmission.			
Enhanced security	Measures to secure and protect all windows that open to building exterior with entry alarms or other devices.			
Door	Enhanced privacy	Solid doors (e.g., materials with high noise reduction ratings - noise reduction coefficient (NRC), sound transmission class (STC), ceiling attenuation class (CAC)) that sufficiently prevent conversations in one room from being overheard by other patients in neighboring rooms/corridors.		
		Minimized potential acoustic "holes" (e.g., pocket doors).		
		Solid doors (including location and swing direction) to protect patients in rooms from being seen from outside the rooms.		
	Improved access/wayfinding	Door design that facilitates pass-through of wheel chaired patients (e.g., wide door, clearance at the opening side).		
HVAC	Reduced patient stress/anxiety and improved satisfaction	Efficient ventilation to minimize unpleasant smells.		
		Controls to maintain a comfortable air temperature, relative humidity, and airflow speed to prevent dramatic differences between nearby spaces.		
	Enhanced privacy	Ventilation supply and return in each room to prevent sound transmission through door.		
	Reduced risk of contamination/infection	Ventilation system with features such as HEPA filters or 100% outside air to minimize air contamination.		
	A healthy environment (reduced negative health effects)	Mercury-free and CFC-free HVAC equipment to minimize potential health risks and environmental impacts.		
		High-performance ventilation systems (e.g., high ventilation rate) to minimize VOC levels and smells.	Klas, Dan, & Roland, 1995; Mendell, Lei, Apte, & Fisk, 2005; Rios et al., 2009	
	Reduced resource consumption	High-efficiency HVAC equipment that uses relatively less energy for ventilation and air-conditioning	Oregon Health & Science University, 2007	
Appropriate size of HVAC equipment to increase efficiency and reduce energy consumption.				
Lighting	Enhanced communication/interaction	Lighting that allows effective interaction including good recognition of facial expressions of patients, clinicians, and other people in the room.	Okken, van Rompay, & Pruyn, 2013	
		Lighting that minimizes veiling glare and reflection visible to patients and clinicians during face-to-face conversations.		



Design Element:	Desirable Outcome:	Design Strategies:	Reference:
Lighting	Improved work efficiency and patient flow	Moveable and adjustable exam lighting that is available when needed.	
		Lighting sources that provide good color rendering capacity for physical examination.	
	Reduced resource consumption	Sufficient illumination level for medication dispensing to minimize errors (for pharmacy and other places where medication dispensing is performed).	Buchanan, Barker, Gibson, Jiang, & Pearson, 1991; United States Pharmacopeia (USP). (2010).
		Lighting fixtures that include high-efficiency fluorescent lamps and LEDs that use relatively less lighting energy.	
Furniture/ Accessories	Reduced patient stress/anxiety and improved satisfaction	Furniture that is comfortable to use for the majority of patients (e.g., armless chairs for pregnant, obese, or disabled patients).	
		Easy-to-adjust furniture to improve the comfort of various users.	
		Magazines, information booklets, TV, or Internet available for patients.	
		Soothing music and nature sounds accessible to patients.	Gershon, Zimand, Lemos, Rothbaum, & Hodges, 2003; Loewy, Hallan, Friedman, & Martinez, 2005; Schneider, Prince-Paul, Allen, Silverman, & Talaba, 2004; Walworth, 2005
	Reduced staff stress and improved job satisfaction	Hard toys and books available for children of different ages when waiting in the room.	
		Furniture design features that enhance staff comfort (e.g., enough leg room for computer desk, left-handed staff).	
	Improved work efficiency and patient flow	Movable workstations that are easy to access by clinicians and stow away when not in use.	
		Furniture design features that enhance staff comfort (e.g., enough legroom for computer desk, left-handed staff).	
	Reduced risk of contamination/infection	Movable workstations that are easy to access by clinicians and stow away when not in use.	
		Easy-to-clean or antibacterial/antimicrobial finish materials to reduce surface contamination in the design.	
		Surfaces that are smooth, with minimal perforations or crevices.	
	Improved staff health	Minimized horizontal surfaces with ridges, reveals, or seams that could serve as dust collectors.	Williams, Singh, & Romberg, 2003
Adjustable exam tables to facilitate use by special needs patients (e.g., low-height motorized exam table for obese patients).			
Casework/ Storage	Reduced patient stress/anxiety and improved satisfaction	Improved patient access/wayfinding	
		Layout and fixture design that prevents patients from directly viewing trash and medical waste.	Tsai et al., 2007
		Plenty of storage space (e.g., cabinets that conceal medical gear) to reduce clutter.	
	Reduced risk of contamination/infection	Plenty of storage for patients' personal items (e.g., coats, umbrellas) during the waiting process.	
		Easy-to-clean or antibacterial finish materials to reduce surface contamination.	
		Smooth surfaces, with minimal perforations or crevices.	
	Minimized horizontal surfaces, ridges, reveals, or seams that could serve as dust collectors.	Williams, Singh, & Romberg, 2003	
	Separate storage areas for clean and dirty supplies.		



Design Element:	Desirable Outcome:	Design Strategies:	Reference:
Plumbing/Sink/ Alcohol Gel Dispenser	Reduced patient stress/anxiety and improved satisfaction	Drinking water easily accessible to all patients, staff, and visitors.	
	Reduced risk of contamination/infection	One sink and one alcohol gel dispenser located within easy reach in each clinician-patient interaction space.	Zuckerman et al., 2009
		Plenty of sinks and/or alcohol gel dispensers located within easy reach of patient and staff walking paths.	
	Reduced resource consumption	Faucets and toilets that are low flow and use relatively less water.	Massachusetts Water Resources Authority, n.d.
Water recycling system that facilitates water reuse (e.g., storm water, gray water, air-conditioning condensate) and reduces water consumption.			
Patient Handling/ Movement Equipment (ceiling lifts)	Improved staff health	Patient lifts (portable or ceiling mounted) and other equipment for patient handling and movement.	
	Improved work efficiency and patient flow		
Communication/ Monitoring Equipment	Enhanced communication/interaction	Wireless or wired connection to facilitate communication of electronic medical records and telemedicine procedures.	
		Equipment for clinicians to conduct teleconferences with remote patients.	
	Improved work efficiency and patient flow	Visual indicators such as color flags and lights that communicate clearly to staff the presence of a patient in each room and type of service needed.	
Change-readiness/ future-proofing		Flexible building design to accommodate potential changes in the medical and communication technologies.	
Sound-Masking Equipment	Enhanced privacy	Sound masking to prevent conversations from being overheard by other patients in nearby areas.	
Privacy Curtain	Enhanced privacy	Curtains to protect patient privacy by blocking views from accompanying family members and interpreters during a physical exam.	
		Curtains and other visual barriers to prevent patient-sensitive information (such as weight measurements) from being viewed by other patients or staff.	