Virtual Simulation Training System (VSTS): Home healthcare hazard training

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Background

- ✓Rapid growth of home healthcare and home healthcare personnel (HHP)
- ✓HHP incurred 352 lost time injuries per 10,000 full-time workers
- ✓Home environmental hazards accounted for ~ 60% of injuries and illnesses
- ✓Hazards can negatively impact job performance, job satisfaction, and health of HHP
- ✓Most home health aide injuries in client homes occurred in the bedroom (24%), bathroom (18%), and kitchen (9%)
- ✓Current training approaches for HHP are limited

Project Aims (3 Phases)

Develop	Develop a Virtual Simulation Training System (VSTS), using an interdisciplinary, participatory design approach
Assess	Assess the usability, usefulness, and desirability of the VSTS across multiple professional disciplines
Evaluate	Evaluate the efficacy of the VSTS in preparing home healthcare professionals to recognize, assess, and respond to hazards in the home health environment using appropriate risk perception and decision-making processes

Phase 1 Methods

- Interdisciplinary participatory design approach

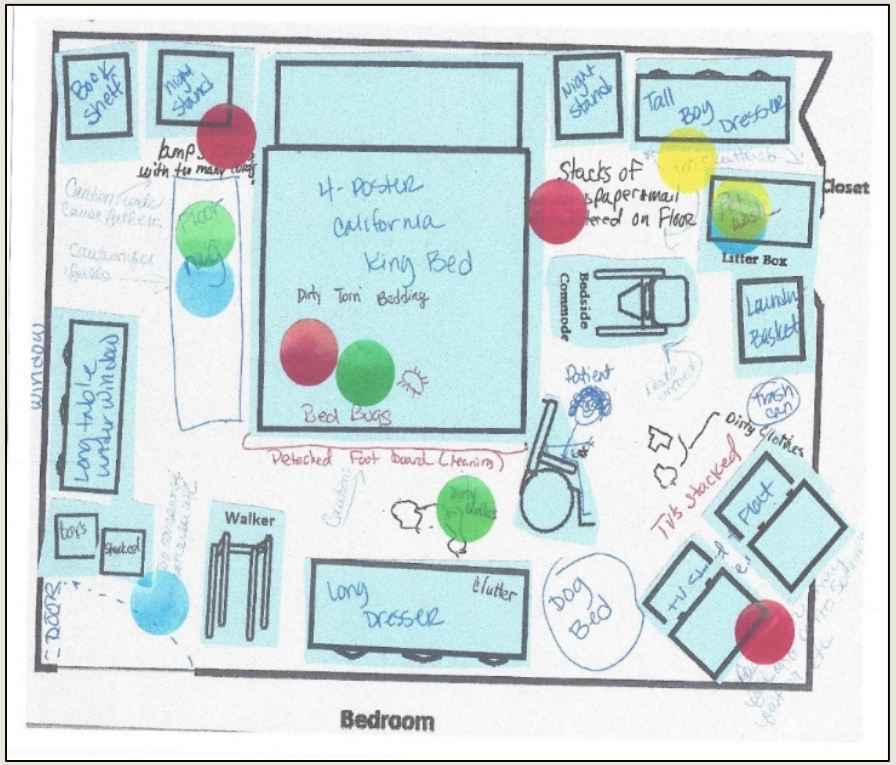
Mixed Methods

- Modified home healthcare worker questionnaire
- Open ended questions in
  - 8 Focus groups (2-5 participants per FG)
  - 37 Interviews
- Room drawings completed by participants

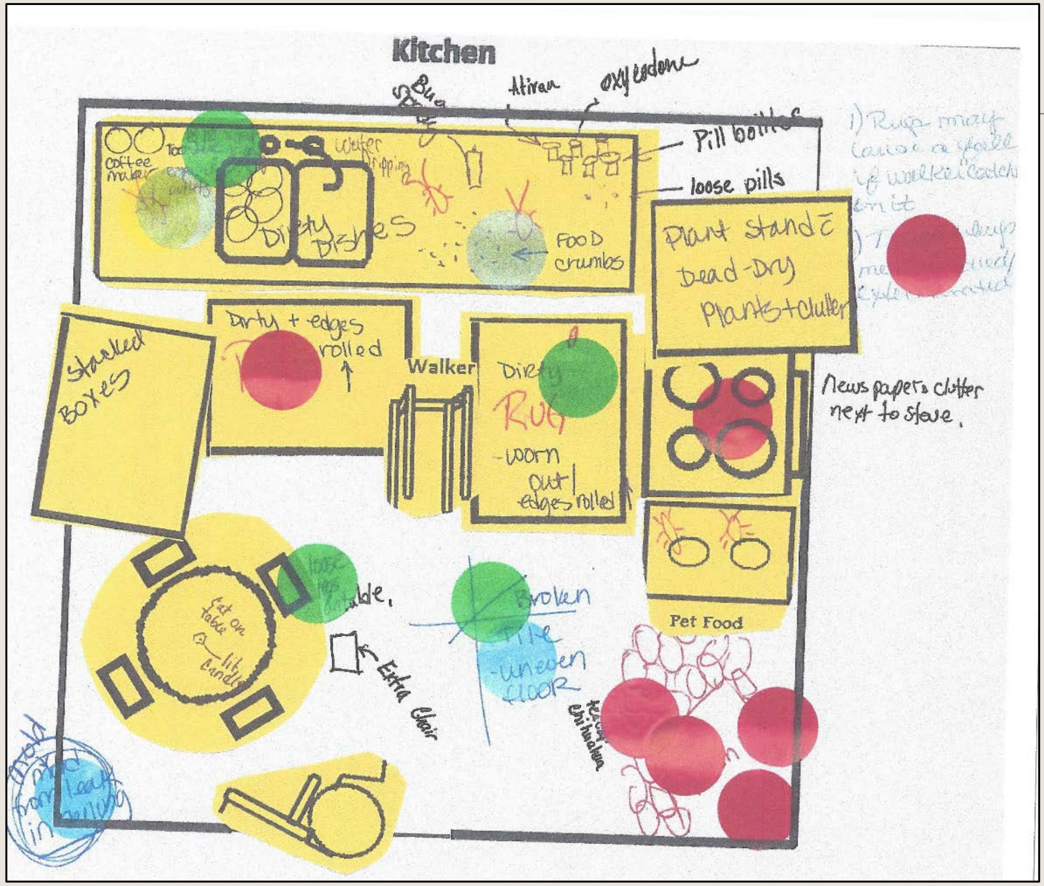
Audio-recorded interviews transcribed and validated for accuracy

Transcript data independently coded by at least 2 coders for

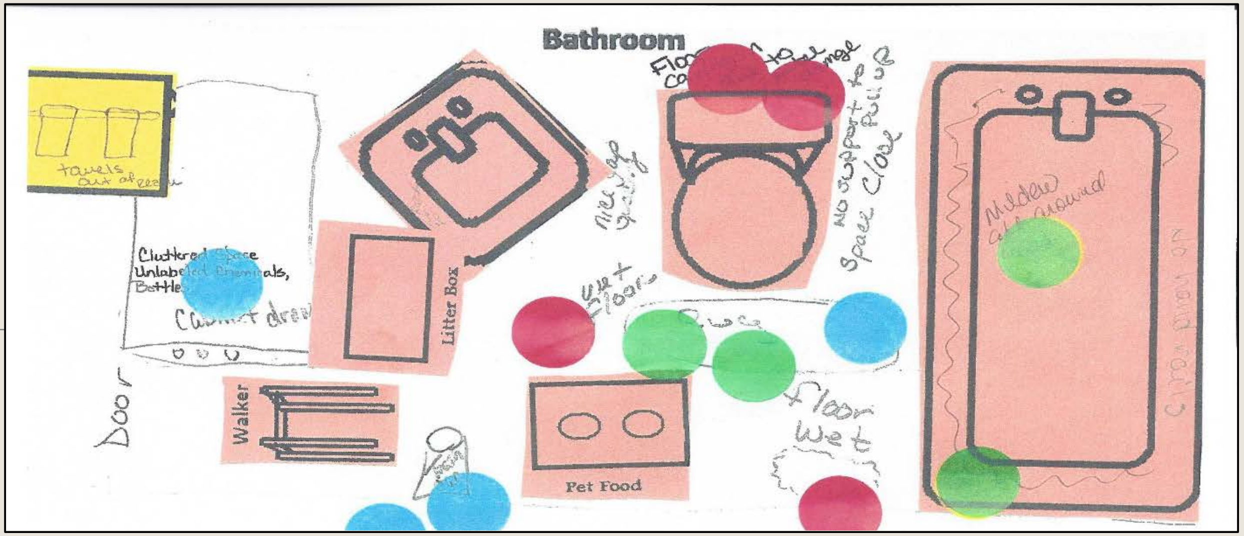
- Types of hazards
- Room of hazard



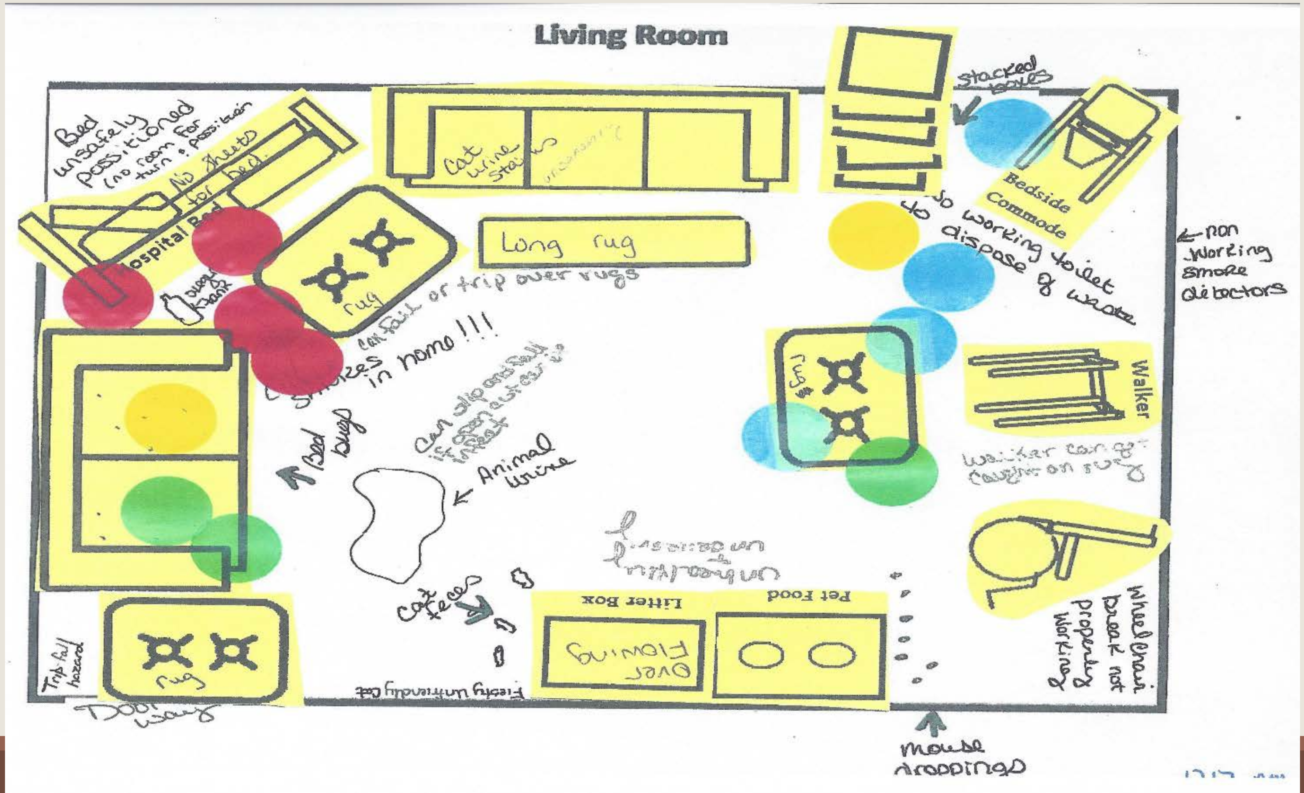
Sample Characteristics (n = 68)	N (%)
Profession	
Nurse (RNs, LPNs)	26 (38.3)
Home health aide	14 (20.6)
Therapist (OT, PT, Other)	15 (22.0)
Educators/Managers/Health and safety experts	13 (19.1)
Participant locations – OH, KY, FL, IL, IN, NC, IA, CO, MN, SC, WA	
Ohio	22 (42.3)
Kentucky	13 (25.0)
Other states	33 (32.7)
Interview method	
Focus group	31 (45.5)
Individual interview	37 (54.4)
Gender	
Female	59 (95.2)
Male	3 (4.8)
Race (n=50)	
Black or African American	5 (7.9)
White	45 (71.4)
Age (n=61; range: 22-73 years)	M = 49 (SD=11.8)
Home healthcare work experience (n=61; range: < 1-36 years)	M = 11.9 (SD = 9.0)



Kitchen
oxycodone
Pill bottles
loose pills
Dirty Dishes
Food crumbs
Plant stand c̄ Dead-Dry Plants+clutter
Stacked Boxes
Dirty + edges rolled
Walker
Dirty Rug -worn out/ edges rolled
News papers clutter next to stove.
Pet Food
Broken Tile -uneven floor
Extra Chair

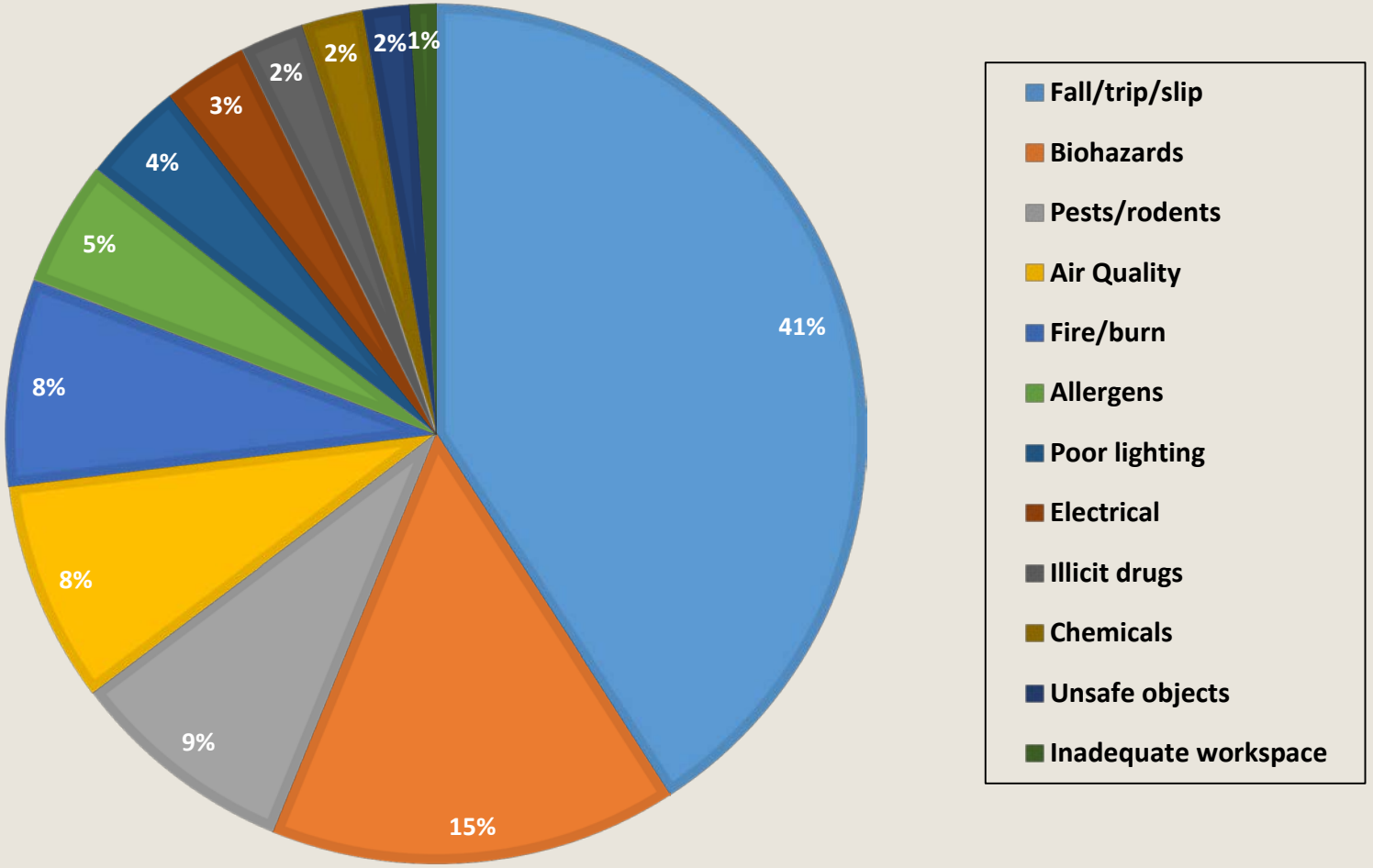


Bathroom
towels out of reach
Cluttered space Unlabeled chemicals, Bottles
Litter Box
Walker
Pet Food
Door
Floor wet
No support to pull up Space close
Mildew all around

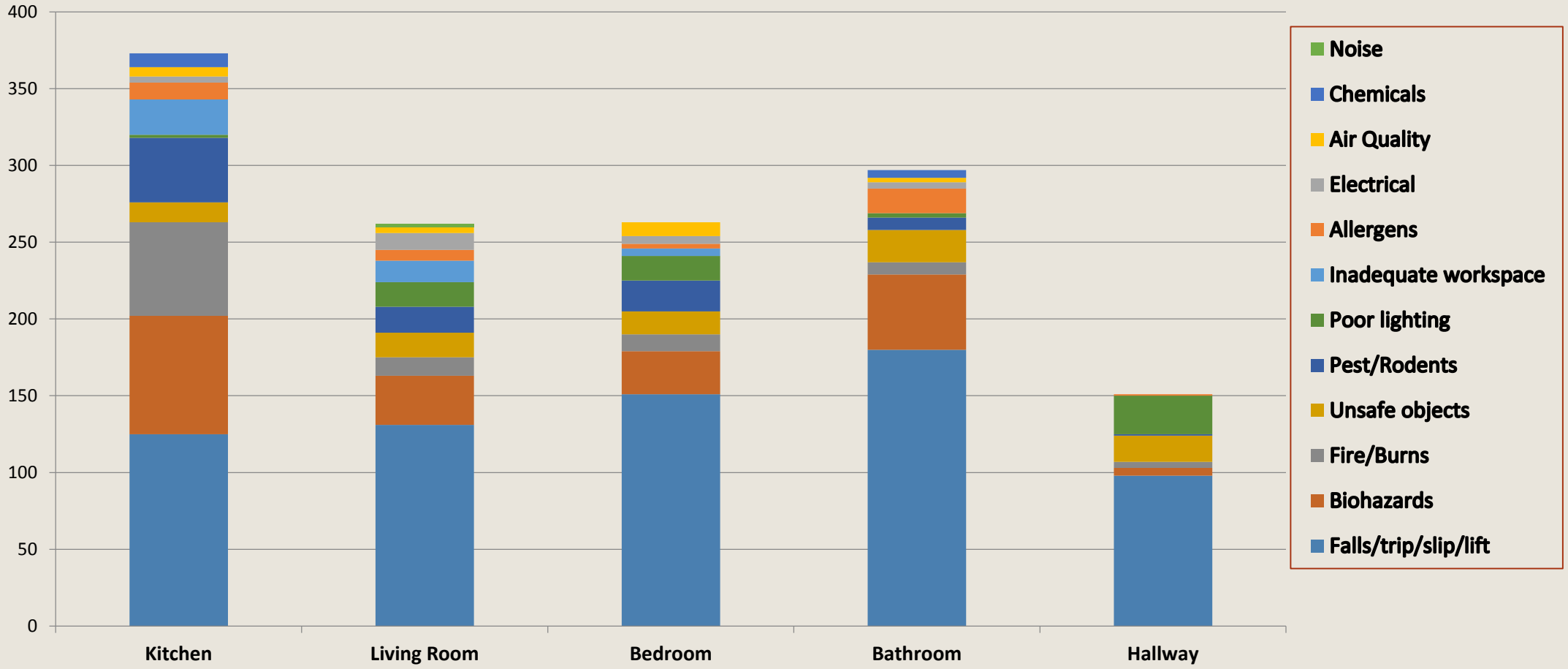


Living Room
Bed unsafely positioned (no room for turn & position)
No sheets for bed
Hospital Bed
Long rug
stacked boxes
Bedside Commode
No working toilet to dispose of waste
non working smoke detectors
Walker
Walker can get caught on rug
Animal urine
Bed bugs
Cat feces
Litter Box
Pet Food
Over flowing
rug
Door way
Trip fall hazard
Wheelchair break not properly working
mouse droppings

ENVIRONMENTAL AND SAFETY HAZARDS ENCOUNTERED BY HEALTHCARE WORKERS AS REPORTED DURING FOCUS GROUPS/INTERVIEWS



Frequency Hazards Mentioned, by Room



Polivka, B.J., Wills, C.E., Darragh, A., Lavender, S., Sommerich, C., & Stredney, D. (2015). Environmental Health and Safety Hazards Experienced by Home Health Care Providers: A Room-by-Room Analysis. *Workplace Health & Safety, 63(*11), 512-522.

Hazard Management Dilemmas – Making Do

Describe decision-making of home healthcare personnel (HHPs) for managing their own health and safety needs in relation to:

- Types of hazard management dilemmas
- Hazard management decision-making (Making Do)
- Level of decision quality (optimal, mixed, suboptimal)

Wills, C.E., Polivka, B.J., Darragh, A., Lavender, S., Sommerich, C., & Stredney, (2015). “Making Do” Decisions: How Home Healthcare Personnel Manage their Exposure to Home Hazards. *Western Journal of Nursing Research*. DOI: 10.1177/0193945915618950

Frequently Mentioned Types of Hazard Management Dilemmas

Hazards Context	Examples of Dilemmas
Electrical and Fire Hazards • Smoking with oxygen	• Client does not refrain from smoking with oxygen
Slip, Trip, & Lift Hazards • Throw rugs, unsafe flooring	• Throw rugs that a client does not remove
Environmental Exposures • Aggressive/underfoot pets	• Client does not confine pets

Hazard Management Decision Quality

Optimal

- Effective in mitigating the health hazard
- Without significant disadvantages for the Home Healthcare Provider or client
  - Example: Home health aide wears rain boots when bathing a client in the shower to prevent the aide from slipping on a wet floor

Mixed

- May or may not be effective in mitigating the health hazard
- Significant tradeoffs for the Home Healthcare Provider and/or the client
  - Example: Preventing a potential fall on snow/ice by shoveling the stairs and path to a home (not in job description; risk of injury)

Suboptimal

- Ineffective or otherwise inappropriate in mitigating the health hazard
- Involves setting aside the health needs of the Home Healthcare Provider and/or client
  - Example: Continuing to provide care without necessary safety equipment, such as grab bars, for transferring a client in the bathroom

Development of an Interactive Virtual Simulation Training System (VSTS) to Train Home Healthcare Providers to Recognize and Respond to Hazardous Conditions in Client Homes

Darragh, A.R., Lavender, S., Polivka, B., Sommerich, C.M., Wills, C.E., Hittle, B.A., Chen, R. Stredney, D.L. (2016). Gaming simulation as health and safety training for home healthcare workers. *Clinical Simulation in Nursing, 12,* 328-335.

Serious Games

"…a mental contest, played with a computer in accordance with specific rules that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives" (Zyda, 2010, pg. 25)

Virtual environments have successfully been used for training and education in a variety of healthcare situations

Zyda, M. (2005). From visual simulation to virtual reality to games. Computer, 38(9), 25-32

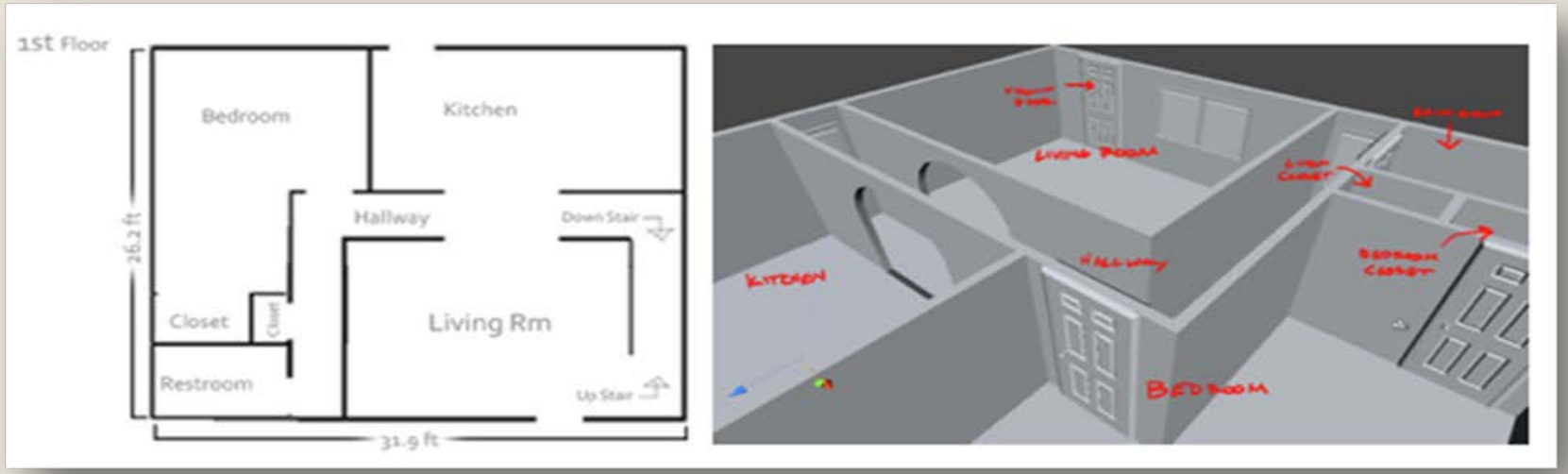

Home Healthcare Training
1
Overview
2
Conduct a Home Walkthrough
3
Training Module Tutorial
4
Electric, Fire, & Burn Training Module
5
Slip, Trip, & Lift Training Module
6
Environmental Training Module
7
Assessment Module Score Check
8
Exit

Structure of the VSTS

Based on drawings from focus groups/interviews

Created basic 4 room design:

- Living room, kitchen, bathroom, bedroom
- Added basement, upstairs bedroom with bath



Addition of Assets

Furniture
- Bed, Tables, Chairs, Desk

Appliances
- Stove, Refrigerator, Heaters, Lights, TV

Household Items
- Books, Dishes, Magazines

Special Effects
- Smoke, Fire, Pet movements

Developing the Training Modules: Floorplans

Electric/Fire/Burn Training Module – Living Room Assets & Hazards

Fan on table has frayed cord

Multi-plug adapter used here

bookcase

lamp

Speakers for Stereo system

TV

Stereo system,

TV, DVD player, VHS player, x-box, phone charger all plugged in to same outlet

Unattended candle near lampshade

Non working smoke detector high up on wall or ceiling

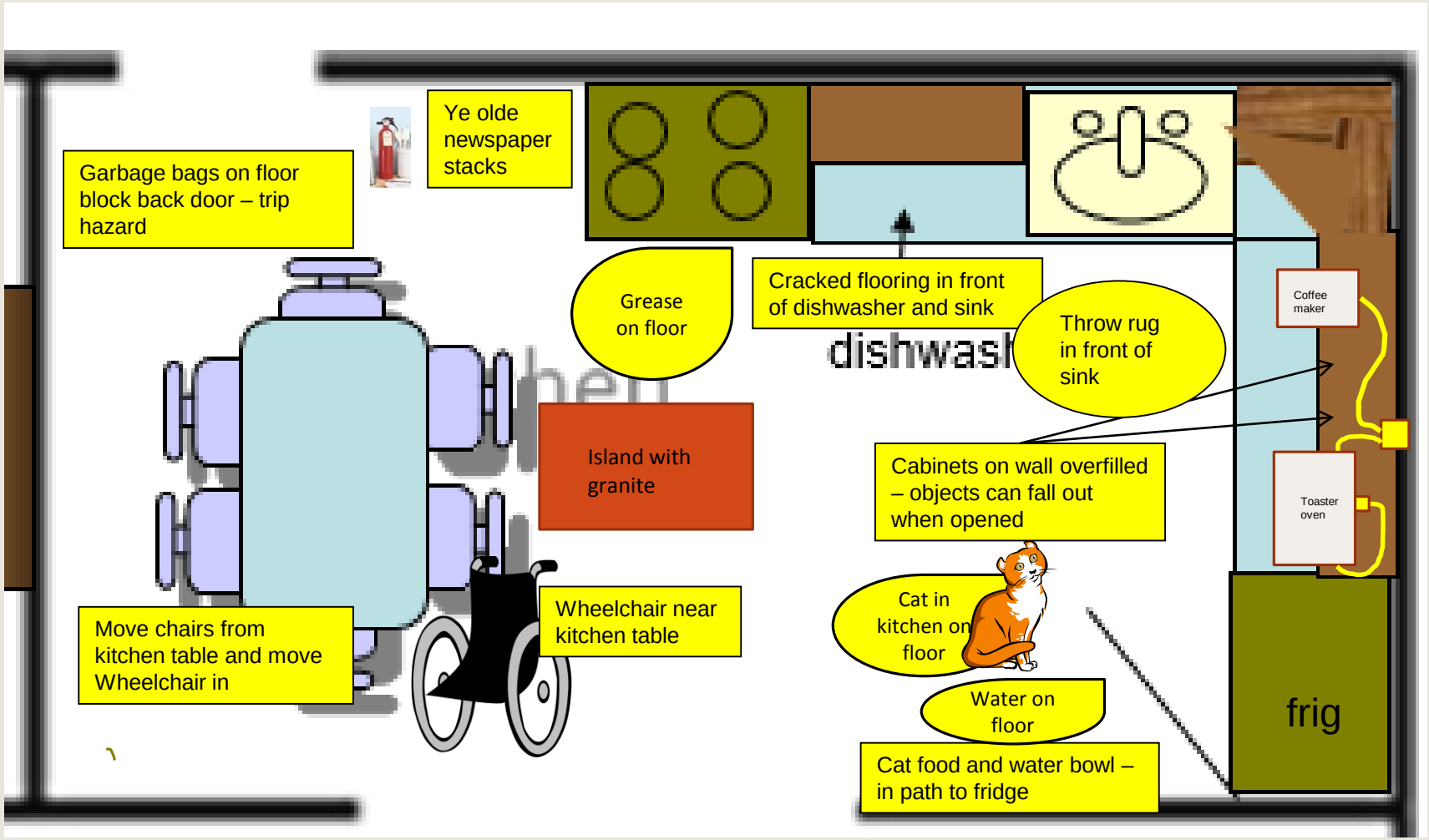
lamp

lamp

Cord stapled to base board

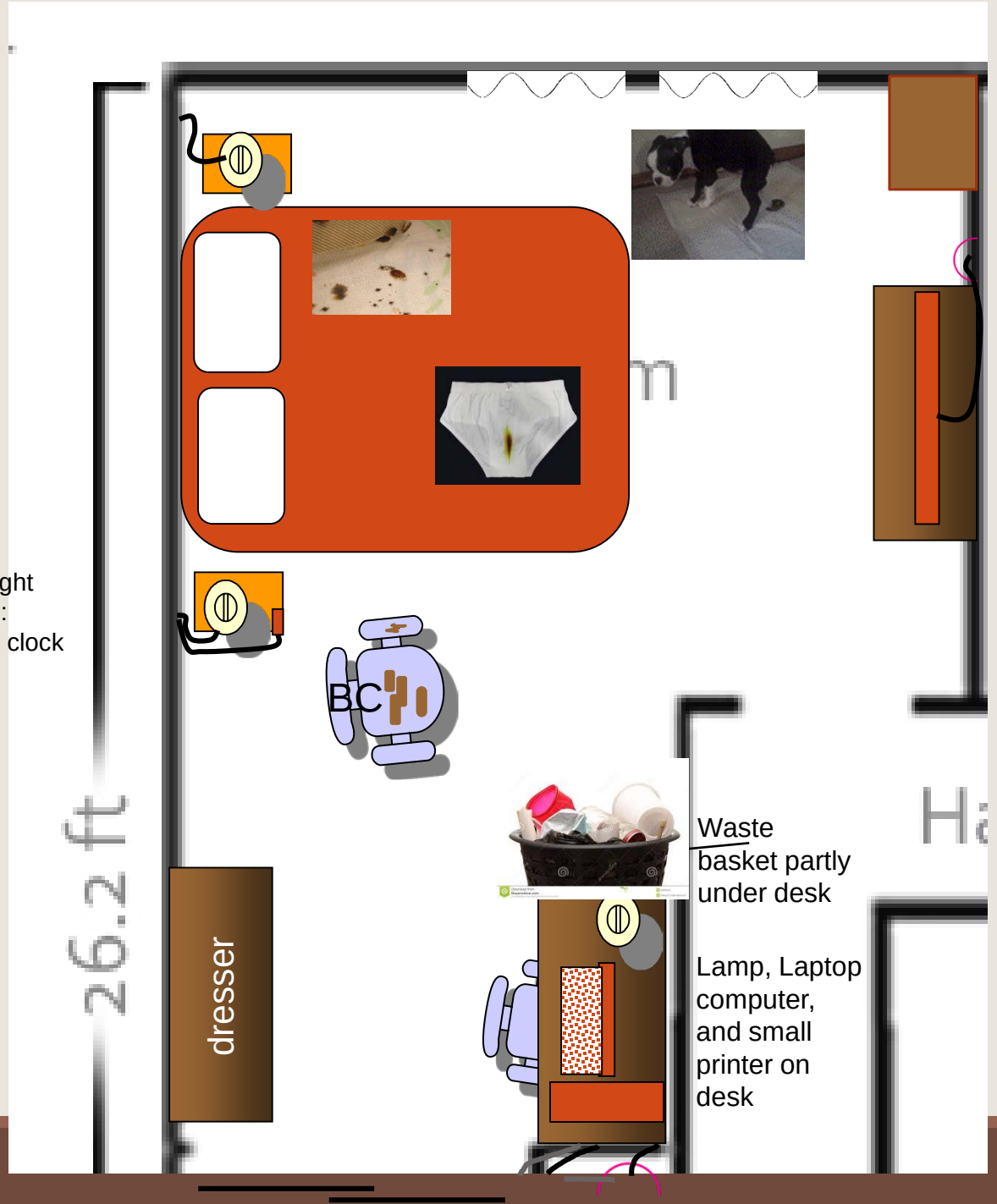
Cord coiled

Picture with lamp – cord runs under mat in front of the door. Dogs playing poker?



Slip, Trip & Lift Training Module – Kitchen Assets & Hazards

Environmental Hazards Training Simulation – 1st Floor Bedroom Assets & Hazards



On night stand: lamp, clock

Waste basket partly under desk

Lamp, Laptop computer, and small printer on desk

Developing the Training Modules: Spreadsheets

Spreadsheets developed for each module, and for each room in the module

Spreadsheets include: Item and location, Hazard picture, Hazard symbol, Why is it a hazard, What to do, Additional Information, Think About

Item & Location	Hazard picture	Hazard symbol	Code - EF, NEF, NC	Is this a Hazard	Why	What to do	Additional Information	Think About…
Space heater with newspapers nearby Location: on the floor next to the stove;			EF	Yes	A space heater near flammable materials, like newspaper, is a fire hazard. Also a space heater has a motor. Appliances with motors can generate sparks, which can cause a fire in an oxygen-rich environment (i.e. a home in which oxygen is in use).	Because your client uses home oxygen, a space heater should not be placed within 10 feet of where oxygen is in use in the home. -Hair dryers and other small appliances with motors should also not be used within 10 feet of where oxygen is in use in the home. -No motorized appliances should be used in an oxygen-rich environment.	In homes where oxygen is not in use, educate clients how to use a space heater safely: (A) Ensure the space heater is at least 3 feet away from anything flammable (such as newspapers) and, (B) Never leave a space heater unattended.	What other kinds of motorized appliances have you seen in homes that could cause a spark and a fire in a home where there is oxygen in use?

Continuous iterative process to develop these with weekly calls/meeting of the research team, and then with home healthcare providers

Living Room – Electric/Fire/Burn Training Module

Bedroom – Slip/trip/lift Training Module

Kitchen – Slip/trip/lift Training Module

Bathroom – Environmental Training Module

Electric/Fire/Burn Hazard Examples

(38 hazards)

LIVING ROOM –EXAMPLES

- Electrical cord under throw rug
- Smoke alarm non-working
- Outlet hanging
- Lit candle
- Ashtray smoldering with O^2 on

BEDROOM - EXAMPLES

- Ash tray on nightstand with smoldering cigarette butts
- Space heater by curtain
- Lava lamp on dresser
- Daisy-chained power strips
- Overloaded power strip

Slip, Trip, Lift Hazard Examples (47 hazards)

BATHROOM - EXAMPLES

- Toilet – no grab bars
- Litter box - clutter
- Throw rug in front of vanity
- Glass shower door
- Plastic lawn chair with arm rests chair in tub

BASEMENT - EXAMPLES

- Clutter on basement stairs landing and stairs
- Dryer sheets on floor

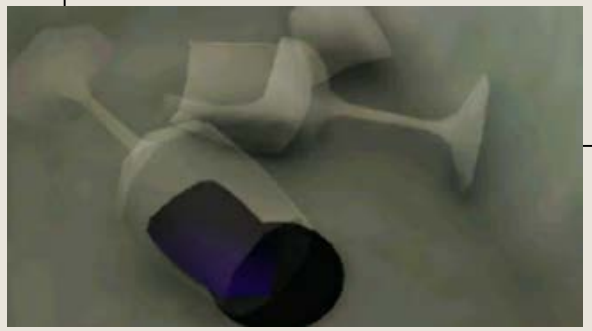
Front Steps - Example

- Snow and ice

Environmental Hazard Examples (42 hazards)

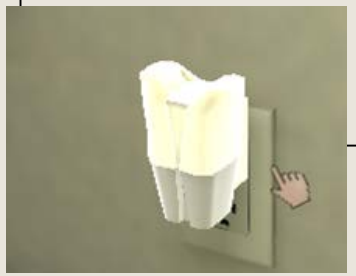
KITCHEN - EXAMPLES

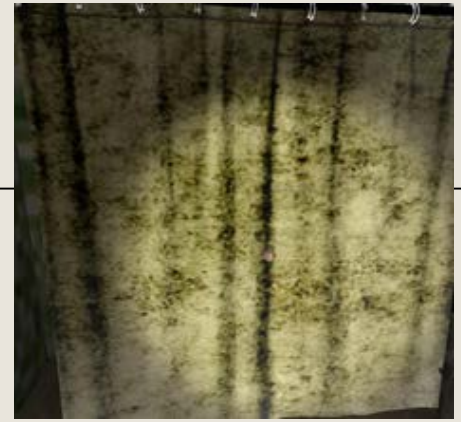
- Gas stove in kitchen - no carbon monoxide monitor
- Needles sticking out of trash bag
- Roaches crawling on wall
- Broken glass in sink



BATHROOM - EXAMPLES

- Air freshener plugged into wall
- Moldy shower curtain
- Cracked toilet seat with brown in cracks
- Soiled adult diapers in trash can



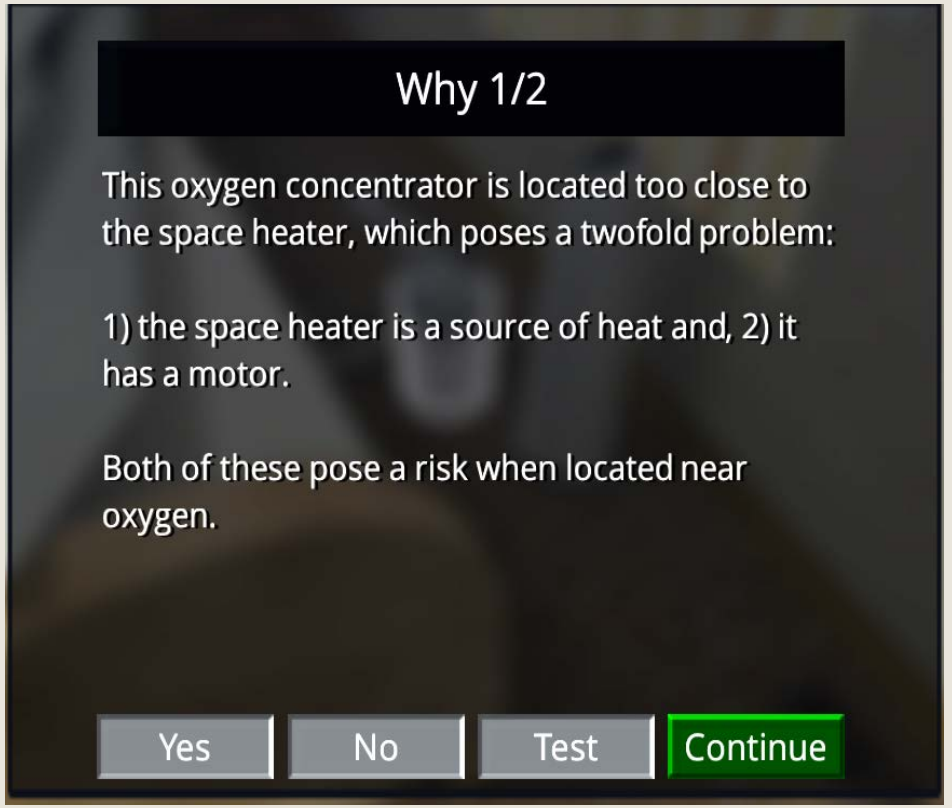


Dialogue Boxes

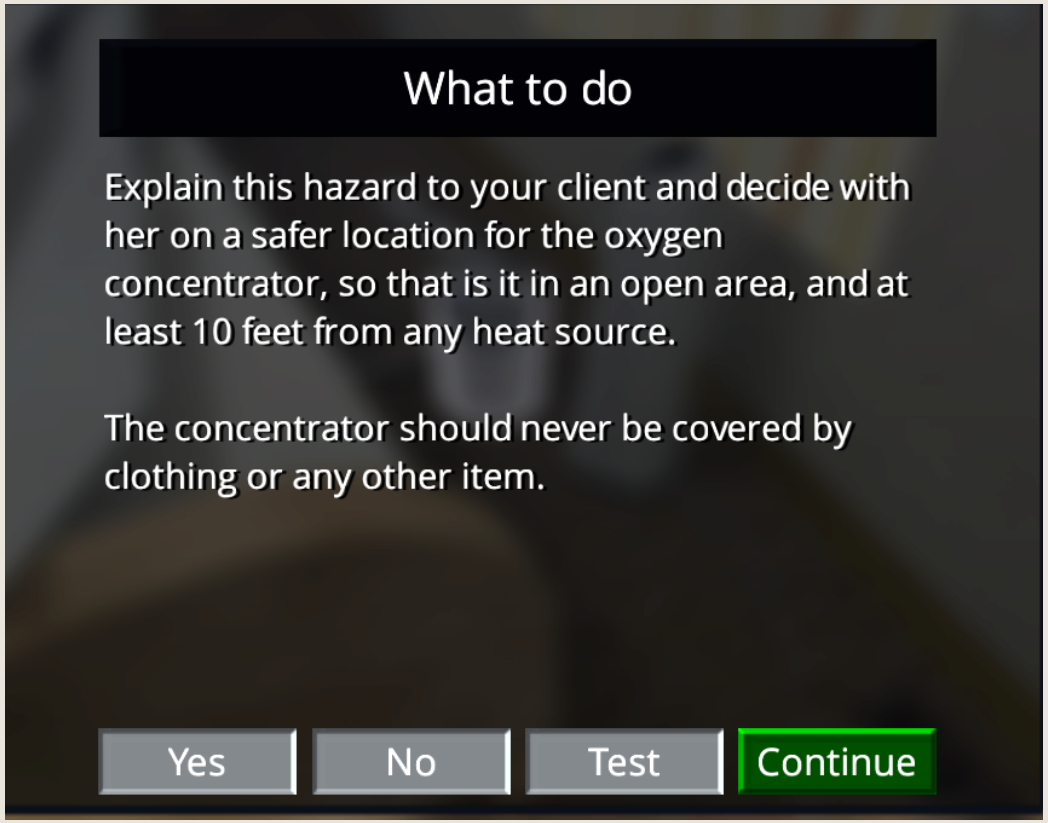
Identify hazard – lights up, select with mouse

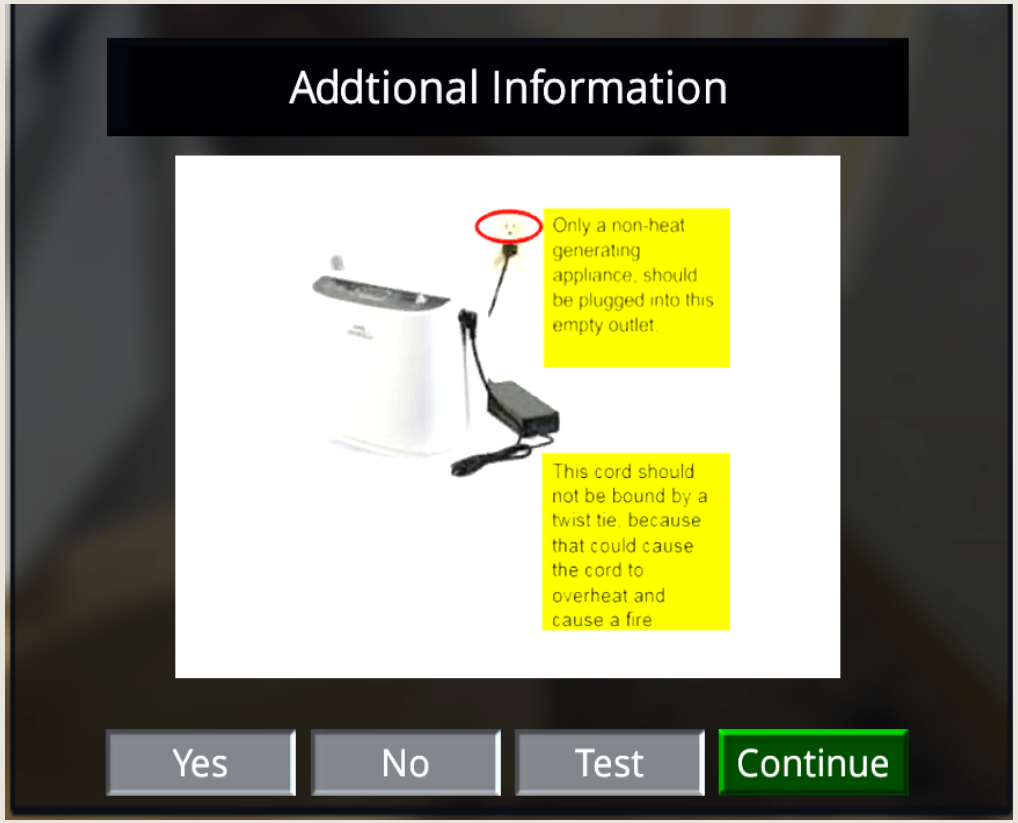
Dialogue box opens

Dialogue Boxes



Dialogue Boxes






Module: Electrical & Fire Hazards
Current Room: Kitchen
Hazards found: 2 out of 11 in this room
Hazards found: 5 out of 49 in this module

Usefulness, Usability & Desirability Findings for Training Modules (N=24)

Usability:

- Easy to use (88%)
- Not too complicated (88%)
- Took too long to finish (25%)
- Easy to move around (75%)
- Keyboard controls easy to use (50%)
- Easy to click on hazards (63%)
- Information boxes easy to click thru (100%)
- Not hard to see hazards (75%)
- Co-workers would not need help to use VSTS (12.5%)
- Co-workers would learn to use VSTS (63%)

Usefulness

- Training help me identify hazards (100%)
- “What to do” Information was useful (100%)
- Program taught me something new (88%)
- Information was too simple (0%)
- VSTS showed too many hazards out of my control (0%)
- Info can help keep home healthcare workers safe (100%)
- Overall rating: M=6.5 (SD=.5) (7=very useful)

Desirability

- Liked the VSTS (89%)
- VSTS was boring (0%)
- I wish we had this at my agency (100%)
- Co-workers would like this training program (100%)

UUD Feedback resulted in addition of Overview, Walkthrough, clarity in opening screen….

Overview, Walkthrough, Tutorial

Overview and Walkthrough - Voice over slides

Overview ~ 5 min.

- Discuss Job Safety Analysis
- Safety Check of each room
- How to move through the Training Simulations

Walkthough ~ 3 min.

- A guide through each room in the home

Tutorial - Interactive

- How to manipulate through the VSTS
- Using the mouse and the WASD keys or the Arrow keys

Assessment Module

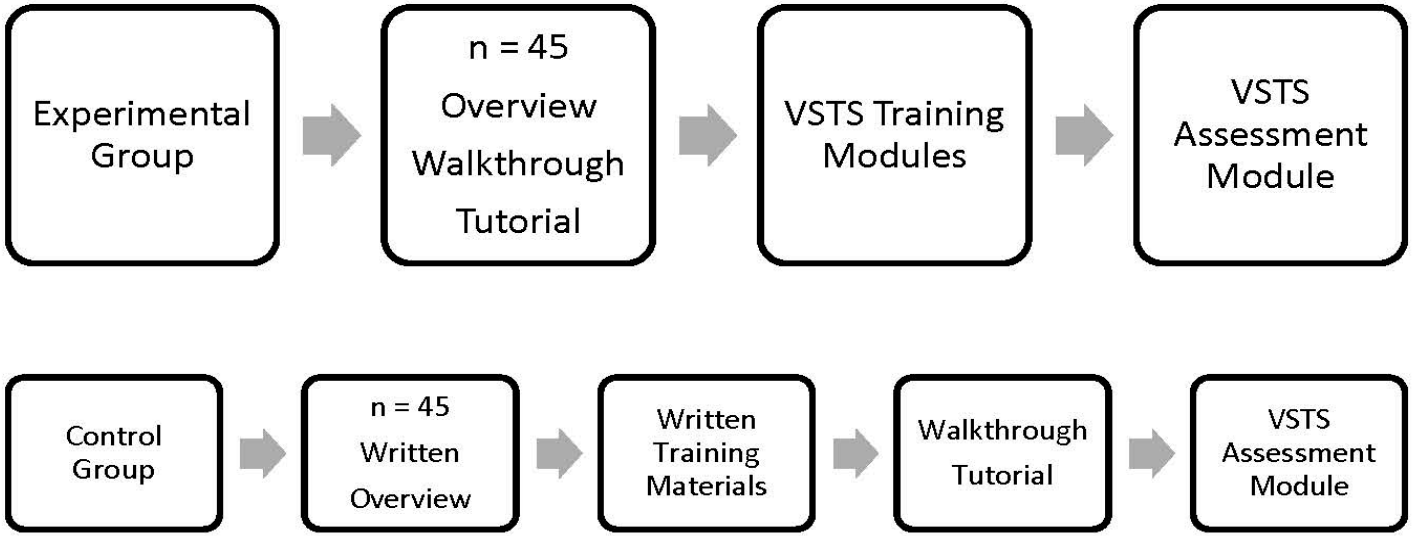
Combines in one simulated home:

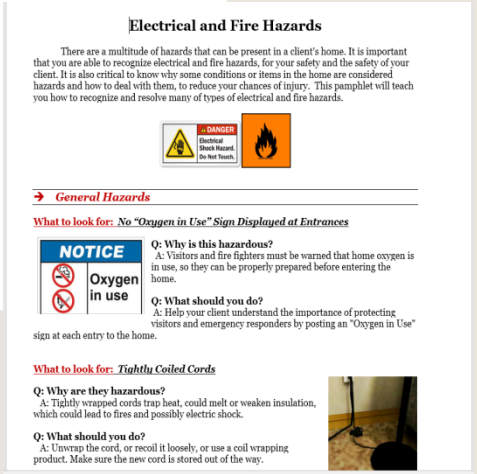
- Electric, Fire, Burn hazards
- Slip, trip, lift hazards
- Environmental hazards

Assesses:

- Ability to identify hazards (yes/no)
- Why it's a hazard (multiple choice)
- What to do about the hazard (multiple choice)

Efficacy Testing (ongoing)





Electrical and Fire Hazards

There are a multitude of hazards that can be present in a client's home. It is important that you are able to recognize electrical and fire hazards, for your safety and the safety of your client. It is also critical to know why some conditions or items in the home are considered hazards and how to deal with them, to reduce your chances of injury. This pamphlet will teach you how to recognize and resolve many of types of electrical and fire hazards.

→ ***General Hazards***

What to look for: ***No "Oxygen in Use" Sign Displayed at Entrances***

NOTICE
Oxygen in use

Q: Why is this hazardous?
A: Visitors and fire fighters must be warned that home oxygen is in use, so they can be properly prepared before entering the home.

Q: What should you do?
A: Help your client understand the importance of protecting visitors and emergency responders by posting an "Oxygen in Use" sign at each entry to the home.

What to look for: ***Tightly Coiled Cords***

Q: Why are they hazardous?
A: Tightly wrapped cords trap heat, could melt or weaken insulation, which could lead to fires and possibly electric shock.

Q: What should you do?
A: Unwrap the cord, or recoil it loosely, or use a coil wrapping product. Make sure the new cord is stored out of the way.

Efficacy Testing-Data Collected

Assessment Module

- Correct answers to:
  - Hazard identification
  - Why a hazard
  - What to do about the hazard
- Time spent deliberating why and what to do

- Training Modules
  - Hazard identified
  - Time spent with dialogue boxes

•Pre-Training:

- Modified Home Healthcare Worker Questionnaire
- Demographic Form

•Post

- Usefulness, Usability, Desirability (UUD) Assessment

•Think-Aloud

Efficacy Testing – Think Aloud Protocol (n=32)

- Purpose – To gather formative and in depth cognitive information processing data on participant perceptions of:
  - Hazard characteristics
  - Beliefs about (hazard) information usefulness (importance) for responses to hazards
  - Affective responses to risk, as represented in the VSTS Assessment Modules
- Randomly selected participants, random assignment to room in Assessment Module
- Participants asked (responses digitally recorded):
  - Describe hazards they see in the room, how likely they are to be harmed by the hazards, how severe the harm would be, how often they see that type of hazard
  - How important is the hazard, how could they manage the hazard
  - What feelings, if any do they have about the hazard

Next Steps

Next steps:

- Finalizing 3D version of the training simulations
- Adding client avatars to the training simulations
- Submitting next grant proposal to assess effectiveness, generalizability, and outcomes of the virtual training simulation system

Questions?

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The COMPASS Total Worker Health® program for home care workers: ***Impact and dissemination***

Ryan Olson, Kelsey Parker, Jennifer Hess, Sharon Thompson, Kristy Luther Rhoten, & Miguel Marino

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A NIOSH Center of Excellence

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Where are we going?

- Why TWH for home care workers?
- Overview of COMPASS iterations
- Research Impacts
- Dissemination

Why TWH for Home Care Workers?

- Isolated work structure
- Unique hazards and stressors
- Injuries 4x average
- Psychological and physical health
- 46% growth by 2018
- Research and Practice Gap
  - Most interventions address wellness
  - A few address safety
  - **Need for structural and supportive TWH approaches**

Images from Gershon's Home Hazard Checklist

How did we address this problem?

- **Integrated elements of effective peer-led social support groups with scripted team-based programs**
- **Targeted Total Worker Health® outcomes**

(Delbecq et al, 2012; Toseland et al, 1989, 1990; Goldberg et al., 1996 and colleagues)

Overview: COMPASS Iterations

- **Pilot with Guidebook 1** (published 2015; n=16):
  6 monthly meetings
- **Pilot with Guidebook 2** (unpublished; n~6):
  6 additional monthly meetings, different style
- **Randomized Controlled Trial** (published 2016; n=149):
  12 monthly meetings with Guidebooks 1 and 2
- **Oregon Home Care Commission (OHCC) adaptation pilot** (unpublished; 5 groups):
  7 bi-weekly meetings
- **OHCC adaptation v2 for statewide dissemination:** soft launch July 2017

COMPASS pilot: Guidebook 1 (n=16)

(April -Nov 2012)

- Well attended (**90%**) and liked (**4.1**/5 pt. scale)
- **18%** pre/post meeting knowledge gains
- **60%** reported making changes between meetings
- Life satisfaction and negative affect significantly improved ($p<.05$).
- **21 of 28** safety/health outcomes changed in expected directions and 11 had standardized effects $d > 0.20$ (max $d = 0.65$)

Olson et al. (2015) Journal of Occupational & Environmental Medicine

Randomized Controlled Trial

(April 2013 – Oct 2015)

16 Groups (N = 149)

8 | 8

Intervention

COMPASS	CONTROL
Baseline (n=75)	Baseline (n=74)
6 mo (n=55)	6 mo (n=63)
12 mo (n=54)	12 mo (n=58)
24 mo	24 mo

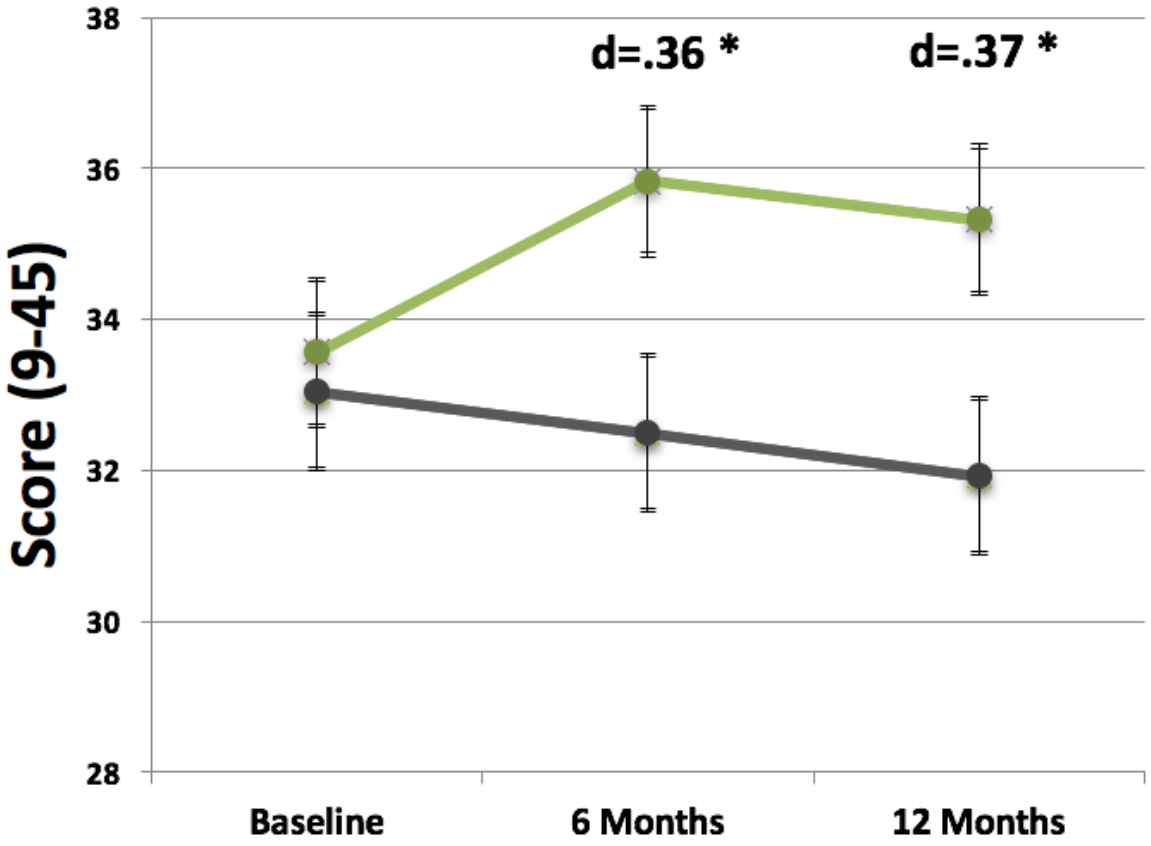
Both Groups:

- Survey
- Health Assessment
- Interviews

RCT participants (n=149)

- Female **89%**
- Caucasian **74%**
- Average
  - **51.6 yrs old**
  - **BMI 31.9**
  - **7.4 yrs home care experience**
  - **24.1 weekly work hrs**
- **39% depression diagnosis** (at some time in life)

IMPACT:
Experienced Community of Practice



Green = intervention

d = Effect Size

Small = .20
Medium = .50
Large = .80

*statistically significant

Olson et al. (2016) American Journal of Public Health

IMPACT: Behavior Changes (p<.05)

- **Using new tools for housecleaning (6 mo. *d*=.51, 12 mo. *d*=.64)**
- **Using new tools for moving objects and/or CEs (6 mo. *d*=.65)**
- **Communicating with CEs about safety hazards (12 mo. *d*=.84)**
- **Correcting slip, trip, fall hazards (12 mo. *d*=.45)**
- **Eating more fruits and vegetables (12 mo. *d*=.31)**

Consumer-employers independently confirmed significant safety improvements

IMPACT:
Physical Health and Symptoms (p<.05)

- **6 mo HDL (*d*=.22)**
- **6 mo lost work days due to injury (*d*=-.66)**
- **12 mo grip strength (*d*=.29)**
- Symptoms/injuries trended downward (ns)

IMPACT: Qualitative results from in-depth interviews

Stories of job demands, resources, resource gaps, and experienced support

If you say you're going to be there at 9:00 for someone, you're going to be there at 9:00! Now, if you have a person who's waiting for you and laying in bed because they can't get up by themselves, and you're 20 minutes late, . . . can you imagine -- "I can't get up by myself, and I gotta go to the bathroom. I don't want to wet my pants. . . . I'll be so humiliated!" (Clara, May 19, 2015)

I'm starting to realize that I need some assistance from durable medical equipment . . . There's things my [CE] should be having that would make the care worker's job easier … There's days that my [CE] can't stand up and use her legs. (Tate, July 3, 2015)

I had been holding it all in, [but after sharing with my team], I felt good. Sometimes . . . you're just thinking you're going to scream, but you cannot scream. I felt that way . . . I felt like I got rid of something (Olive, May 23, 2015).

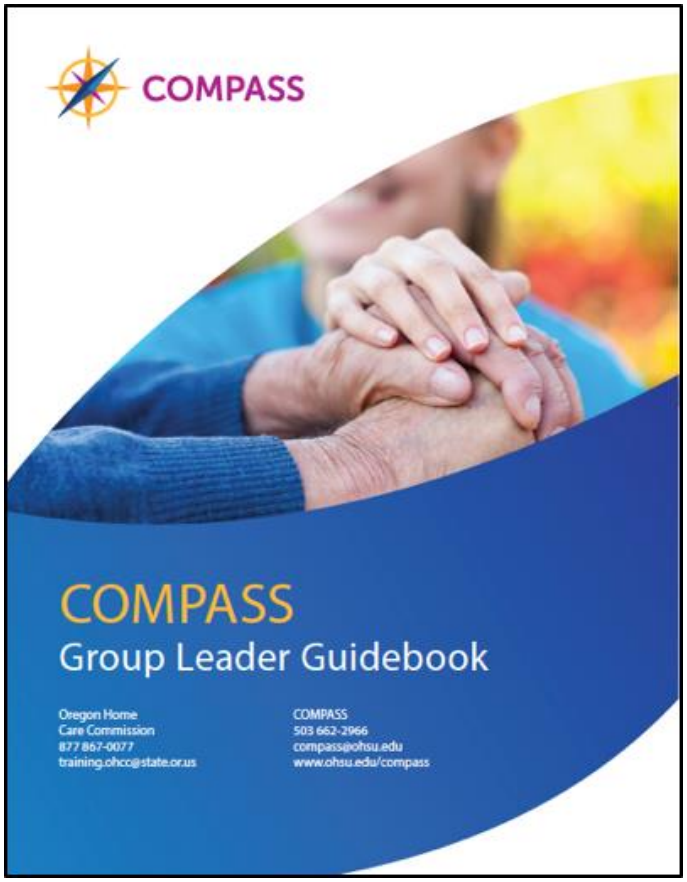
When I start getting in a stressful situation . . . I go back to the [COMPASS] book. . . . [Also, I am] tracking for vegetables . . . I use this . . . bead bracelet . . . [and] the step counter . . . The exercises, too – at home, I'm doing it. And I remember the positions [neutral spine posture]. . . I implement it in my life and in my work (Olive, May 23, 2015).

DISSEMINATION: Setting/Context

Oregon Home Care Commission (founded in 2000)

- Training system
  - Available to 60% of Oregon's home care workers who care for consumer-employers enrolled in publicly funded programs (12,500+)
  - 24 courses, nearly 100 classes offered monthly
  - Workers paid for all non-repeated classes per year
  - Registry benefit IF…
    - Four classes annually, one safety class every two years
  - Professional Development Certification:
    - Nine specific classes, CPR/first aid, 80% on assessment test, no show <20%
    - 50 cents more per hour

DISSEMINATION: Adaptations



- Trainers as “facilitators”
- Rotating peer leaders
- Bi-weekly meetings
- Goal setting options
- No food, step counters, knee pads, or certification incentives

Adaptation pilot results (5 groups): *Still changing stuff?*

- ✓ Experienced Community of Practice (d=.95)
- ✓ Tools/practices for housecleaning (d=.39)
- ✓ Fruit and veggies (d=.31)
- ✓ Sugary snacks (d=-.39)
- ✓ Sugary drinks (d=-.35)

Observation: “Directive-ness” of trainer-facilitators seemed to create different dynamics in groups

Expect the unexpected!

The dissemination partnership odyssey

Sept 2015 through today


…but we've reached a fabulous destination!

Jan 2016 - Today:
Bi-weekly partnering calls

Cheryl Miller, Executive Director
Oregon Home Care Commission

COMPASS-OHCC v2

- OHSU-OHCC agreement signed
- Facilitators mix of community health workers and professional trainers
- SEIU EAP resources in “extras”
- COMPASS earns safety credits
- Data
  - Training evaluation changes
  - Workers comp data
- July 2017 soft launch
- Systematic statewide rollout

DISSEMINATION: Next targets

- **Maintenance "drop-in" groups**
- **Oregon's Personal Support Workers**
  - 1 yr contract with OHCC to expand/adapt
  - **Dr. Parker's** pilot grant from Northwest Center for Occupational Health & Safety (U Wash.)
- **R01 proposal (NIH) with**
  SEIU 775 Benefits Group (Seattle, WA):
  Tailoring for workers with persistent pain
  - Tool provision with hands-on training
  - Cognitive-behavioral pain self-management

Katie Coombes, SEIU Local 503
Care Provider Division Director

Take Home Points

COMPASS STUDY

olsonry@ohsu.edu

OHWC Oregon Healthy Workforce Center

A NIOSH Center of Excellence

Go Partners!

OREGON Home Care COMMISSION
Quality In-Home Services

SEIU Local 503 ORG
SERVICE EMPLOYEES INTERNATIONAL UNION, CTW, CLC

Hospital Patient Room Ergonomics: Getting it right for all hospital staff working in these spaces

Steve Lavender, Ph.D.
Carolyn Sommerich, Ph.D.
Elizabeth Sanders, Ph.D.
Kevin Evans, Ph.D.
Jing Li, M.S.
Radin Zaid Radin Umar, Ph.D.
Emily Patterson, Ph.D.

THE OHIO STATE UNIVERSITY

Why Patient Room Design?

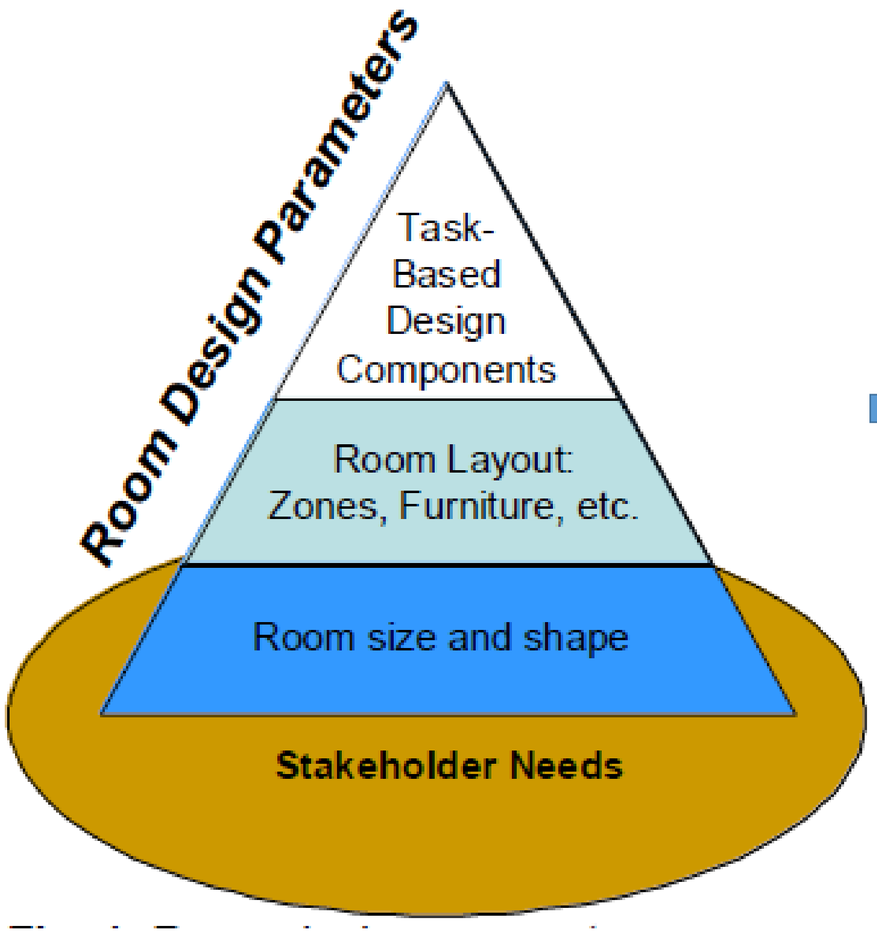
- Hospital patient rooms are workplaces
- Substantial construction in the healthcare sector (Gamble, 2011; Terry, 2011).
- Need for evidence-based design recommendations
  - Meet the needs of all stakeholders providing patient care and services in these rooms.
  - Hignett and Lu's (2007) review of twenty sources of space recommendations for critical care rooms showed that none were based on empirical evidence.

Our Research Objective

Long term: Enhance safety and efficiency of all staff who work in med/surg patient rooms

How: Develop design guidelines for patient rooms that meet the physical and cognitive needs of those providing direct and indirect patient care, based on input from all stakeholders.

Research Hypothesis



Work methods of healthcare workers and hospital staff

- Work performance
- Worker health and safety
- Patient safety & outcomes

- Job satisfaction
- Patient satisfaction


H5046


1019

Emerging Trends in Healthcare

- Movement toward acuity–adaptable rooms
  - Improved operational cost, patient safety and error reduction, and patient satisfaction levels (Hendrich, Fay, Sorrells, 2004).
- Increased provision of in-room clinical services (Patel *et al.* 2006).
- Patients are getting heavier
  - larger beds, larger furnishing for visitors and less work space for healthcare workers
-
-

Opportunities for HF in room design

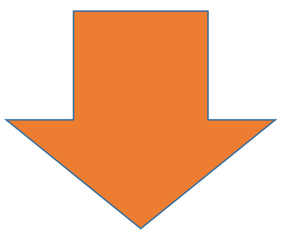
- Historically this has been the domain of architects and interior designers (Stichler and Cesario 2007).
- Limited HF Studies on room design:
  - Ceiling and other mechanical lift devices (Ulrich *et al.* 2008)
  - Space requirements in patient rooms in a critical care unit (Hignett and Lu (2007).
  - Design of bathrooms (Hignett and Evans 2006)
  - Limited published input on patient room design from human factors specialists (France *et al.* 2005).
  - Bayaban, Mendoza, Pentecostes, and Tangsoc, 2015.

Opportunities for HF in room design

- Prior Work
  - Solicited input primarily from nursing staff (Gallant and Lanning 2001, Hignett and Lu 2007 ; Bayaban et al., 2015),
  - Use of effectiveness measures focused almost exclusively on patient-related outcomes and issues related to the nursing staff (Ulrich *et al.* 2008).
- Nurses are a critical element of the patient care system, but other workers are also are
  - In short supply,
  - Leave the healthcare profession due to the excessive physical workload and incurred injuries (Naomi, 2004).

4 Phase Study Design

- **Phase 1:** Focus groups and interviews of all stakeholders
  - *How do room parameters facilitate or interfere with what you do in the room?*
- **Phase 2:** Build the room you would like to work in
- **Phase 3:** Assess the needs of patients and their visitors
- **Phase 4:** Resolve conflicts



Develop guidelines for architects and interior designers

Phase I:

Identify Stakeholder Issues and Needs

Research

THE CENTER FOR HEALTH DESIGN®

Health Environments Research
& Design Journal
2015, Vol. 8(4) 98-114

DOI: 10.1177/1937586715586391
herd.sagepub.com

SAGE

Hospital Patient Room Design: The Issues Facing 23 Occupational Groups Who Work in Medical/ Surgical Patient Rooms

Steven A. Lavender, PhD[1,2], Carolyn M. Sommerich, PhD[1], Emily S. Patterson, PhD[3], Elizabeth B.-N. Sanders, PhD[4], Kevin D. Evans, PhD[3], Sanghyun Park, PhD[1], Radin Zaid Radin Umar, MS[1], and Jing Li, MS[1]

23 Occupational Stakeholder Groups

X-ray tech (7)

Ultrasound tech (4)

Echocardiographer (5)

Vascular tech (2)

Physical Therapy (11)

Occupational Therapy (9)

Speech language pathologist (4)

Respiratory therapist (5)

Nurses (17)

Physicians (6)

Personal Care Assistants (10)

Case manager (2)

Sitters (3)

Dietitian (5)
Nutrition aides (7)
Diet tech (5)

Clinical engineer (8)

Building operation (3)

Zone tech (3)

System shop (2)

Mechanical shop (plumber) (4)

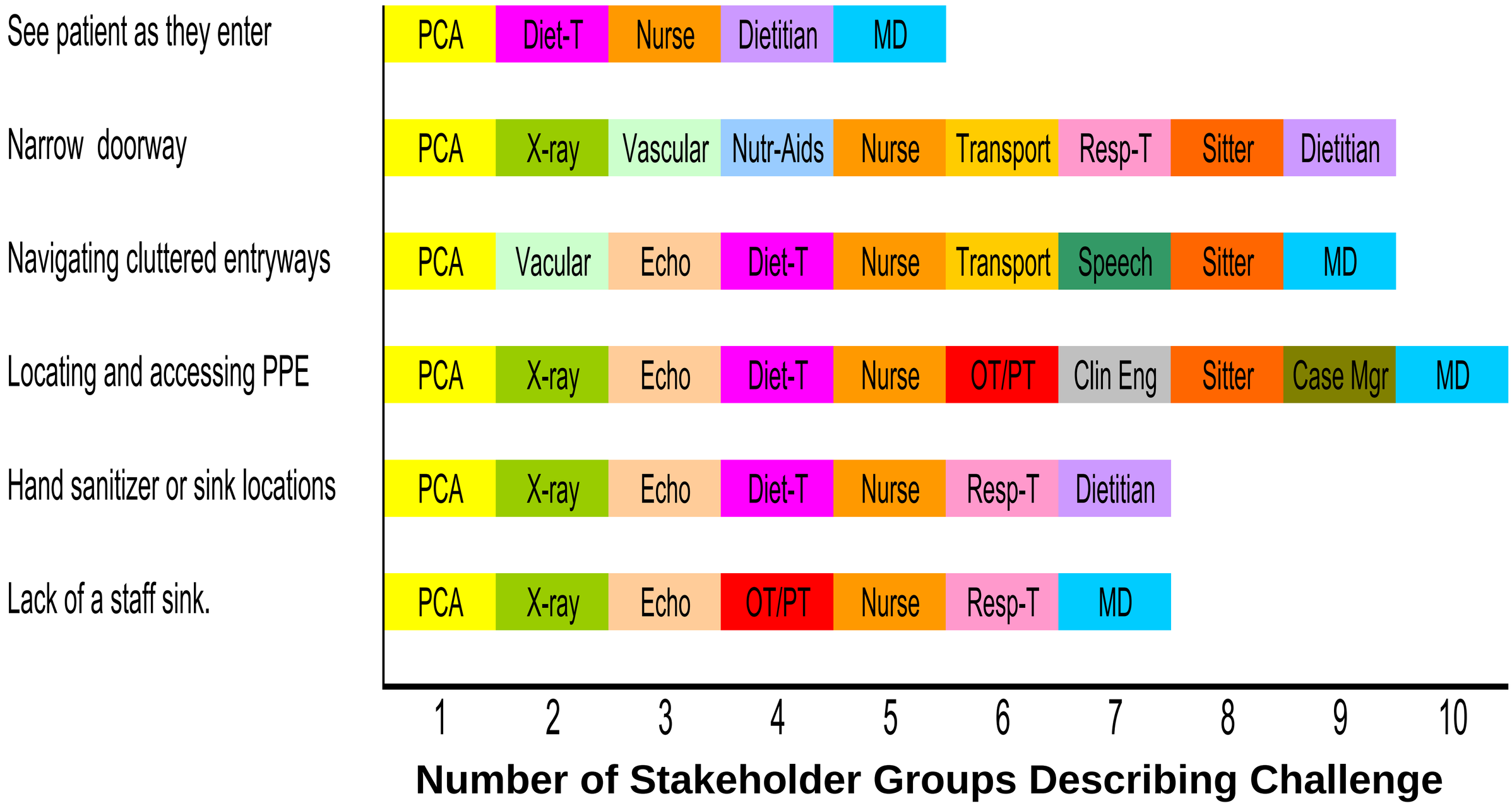
Housekeeper (10)

Transporter (10)

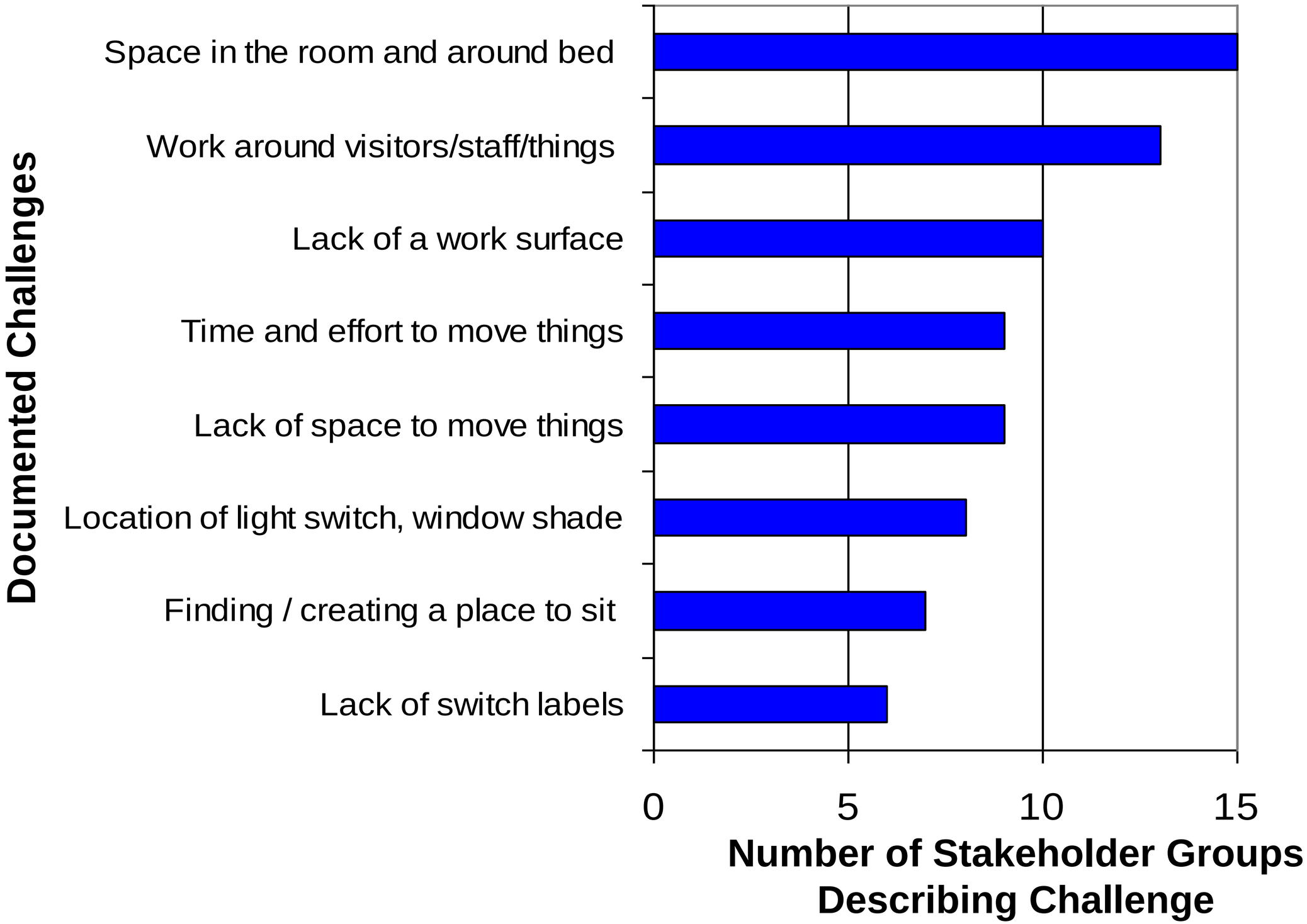
n=146

Entering the Room

Challenges



Preparation



Doing

http://www.wordle.net/

Phase II:

Ideal Room Design

Objective

- To identify patient room design layouts that enable different occupational stakeholder groups to work more effectively in patient rooms.

Participants

- 27 participatory design workshops
  - 104 Participants
    - Mixed groups of occupational stakeholders
    - 24 Occupational Stakeholder groups

Approach

- Simulation space was 27.9 m^2 (300 ft^2) for a <u>single patient room</u>.
  - 4.6 m by 3.0 m
    (15 by 10 feet)
  - Moveable bathroom walls
- Initial room contents
  - Bed (on wheels)
  - Bathroom walls
  - Sofa (on wheels)
- “Build the room”
  - Starting with the bathroom

Making the room

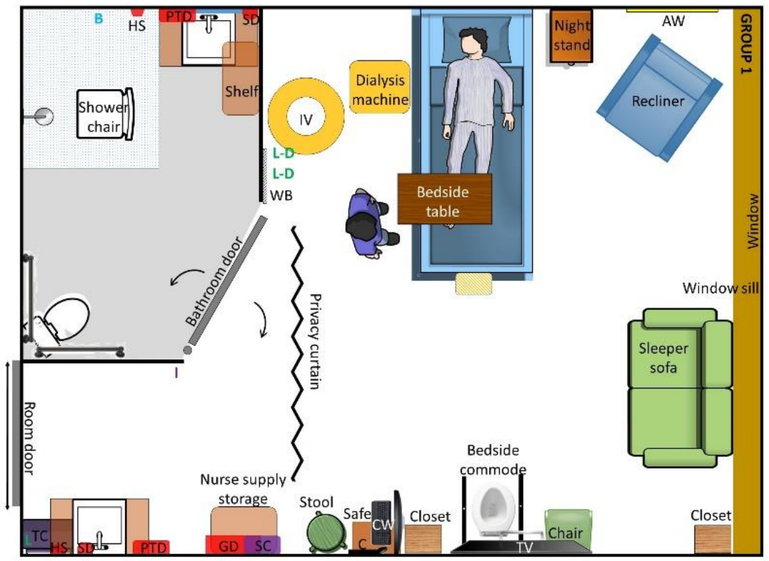
Room testing

Process Limitation

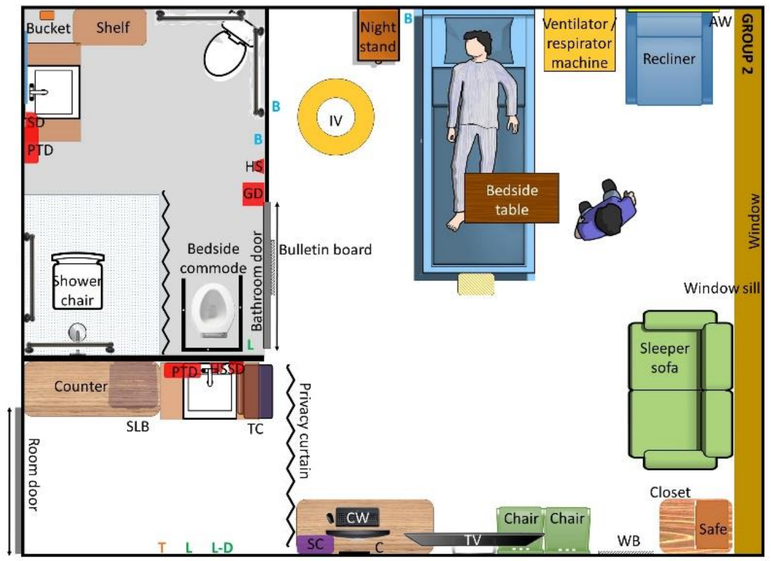
Analysis: Room characterization

- Bathroom location
  - Inboard
  - Outboard
- Bed location / Orientation
  - View patient from doorway?
  - Distance from doorway
  - Distance from bathroom
- Family space
- Entry space

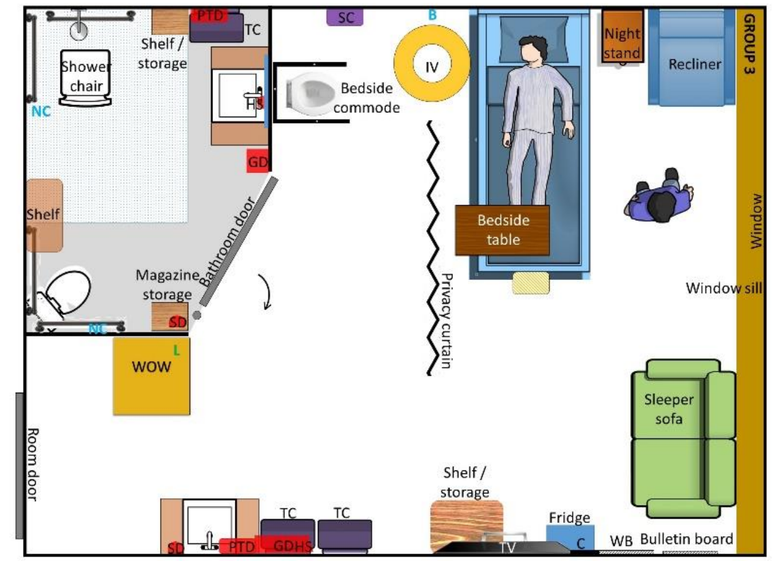
Bed located adjacent to inboard bathroom



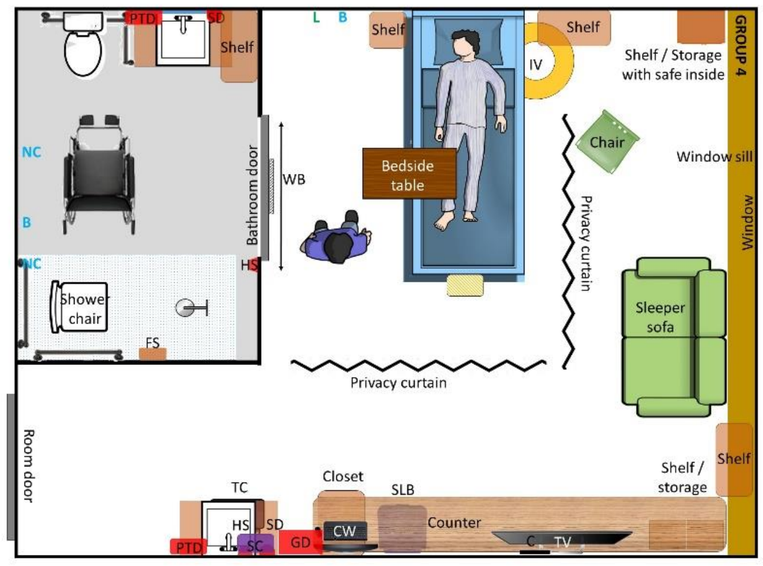
(a) Group 1



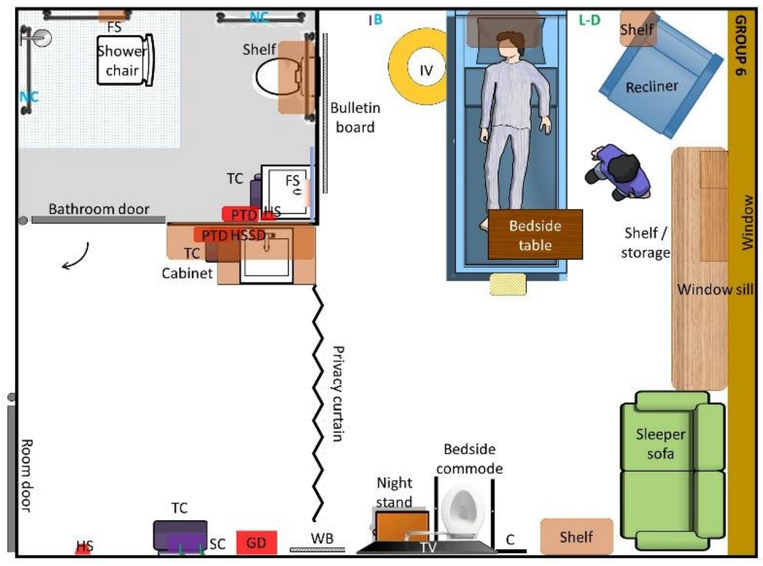
(b) Group 2



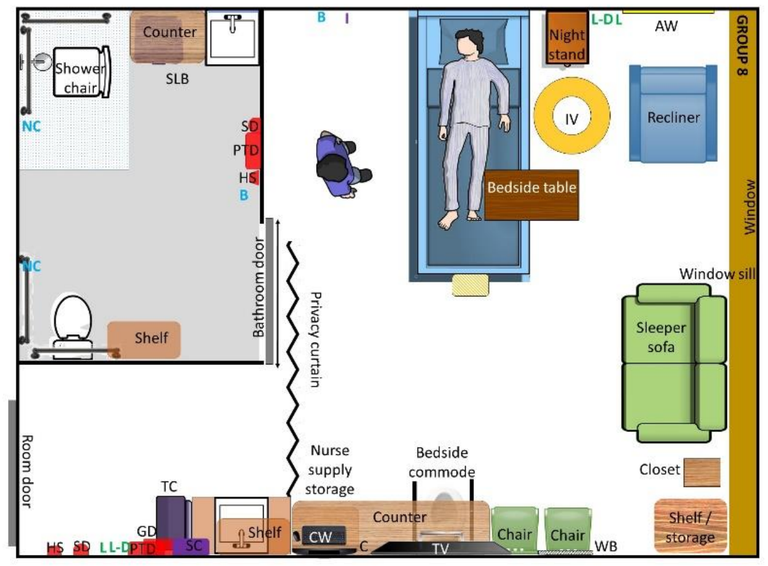
(c) Group 3



(d) Group 4

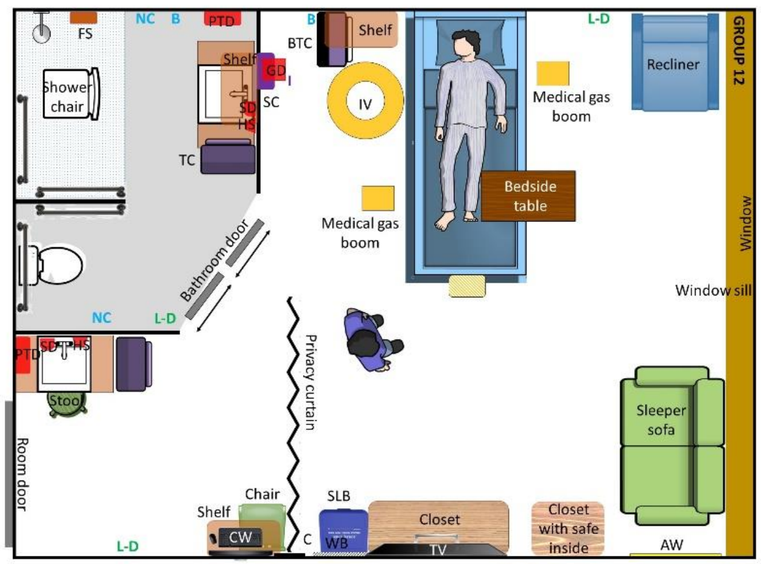


(e) Group 6



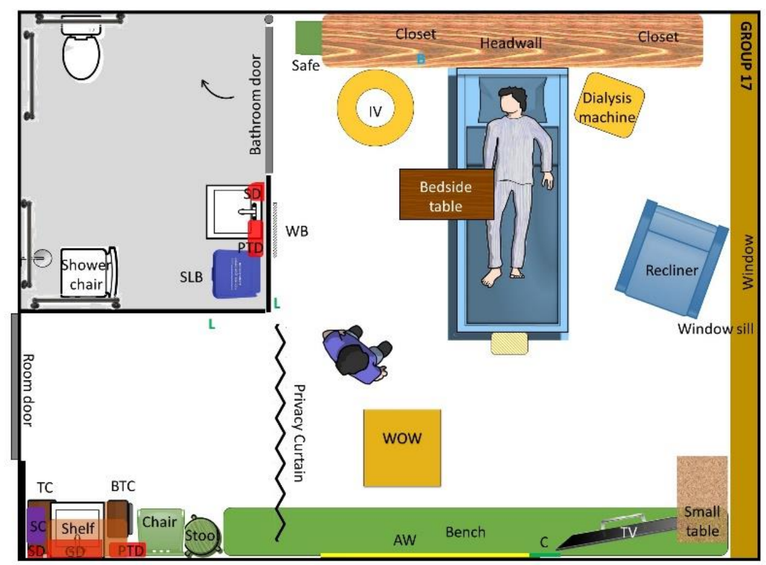
(f) Group 8

Bed located adjacent to inboard bathroom (continued)

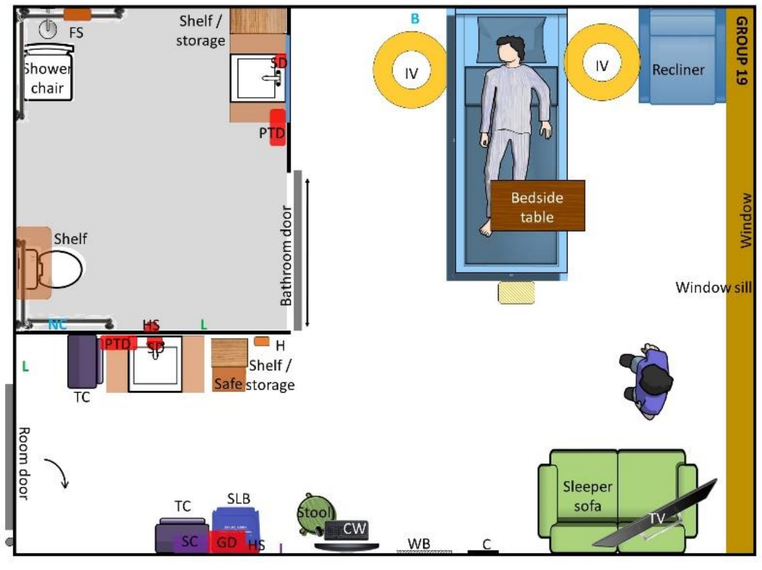


(g) Group 12

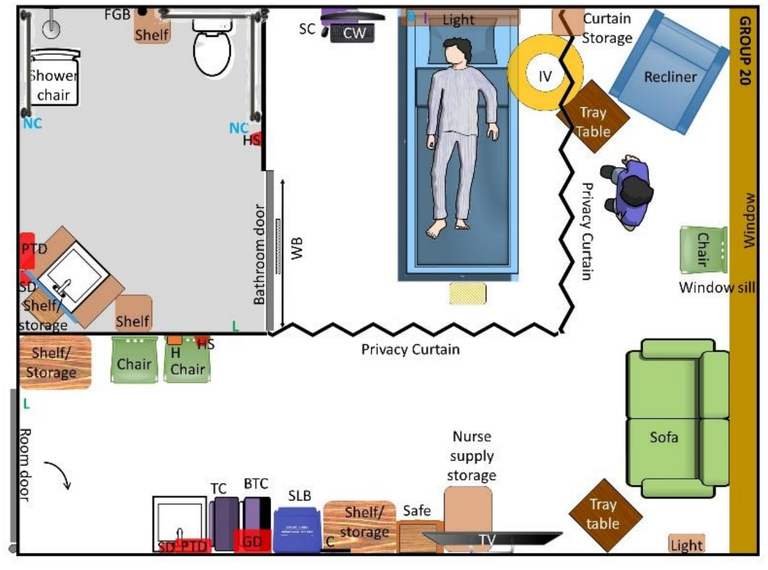
(h) Group 15



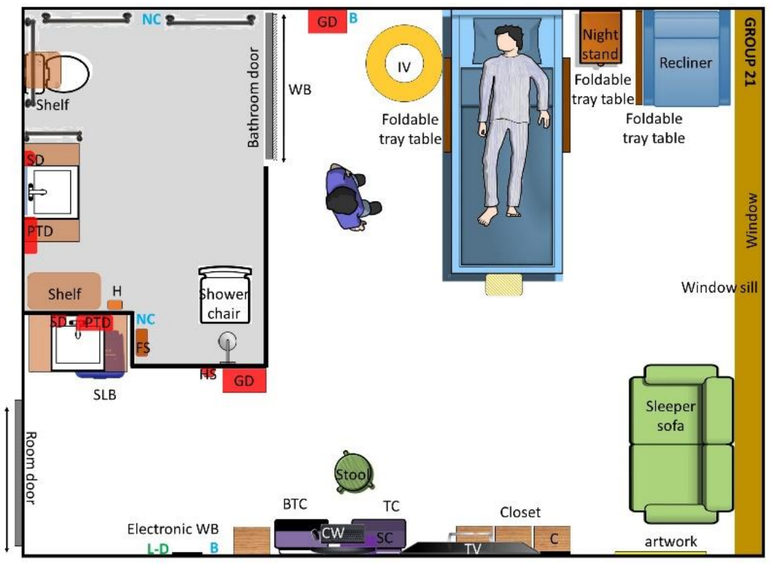
(i) Group 17



(j) Group 19



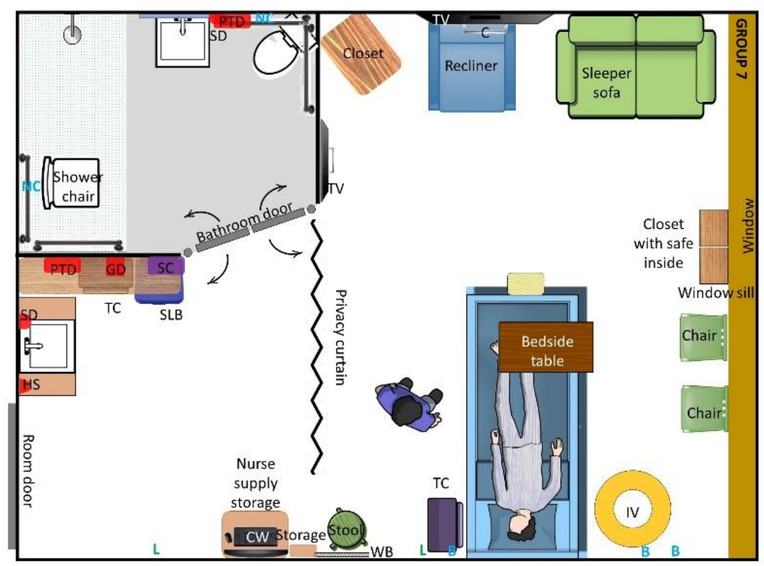
(k) Group 20



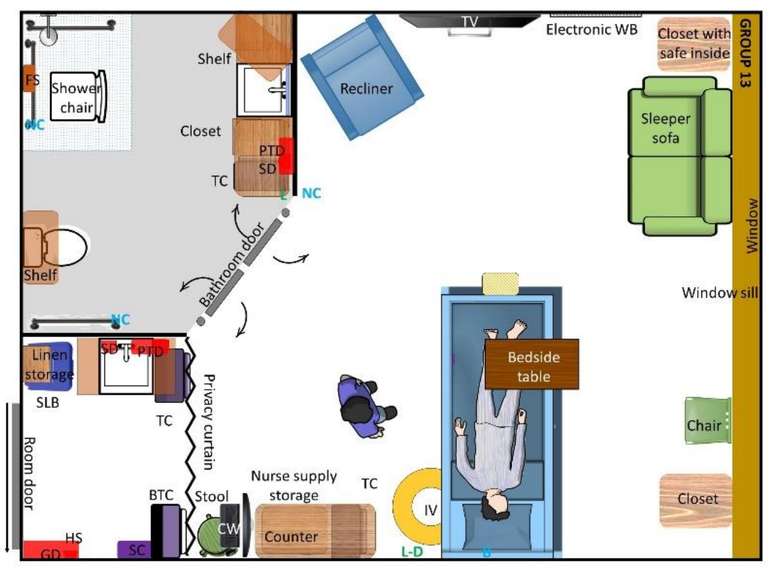
(l) Group 21

Bed across the room from inboard bathroom

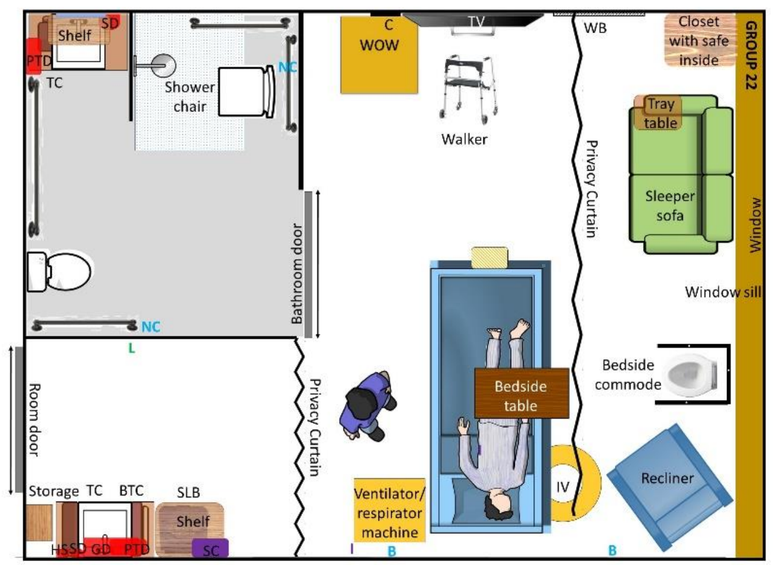
(a) Group 7



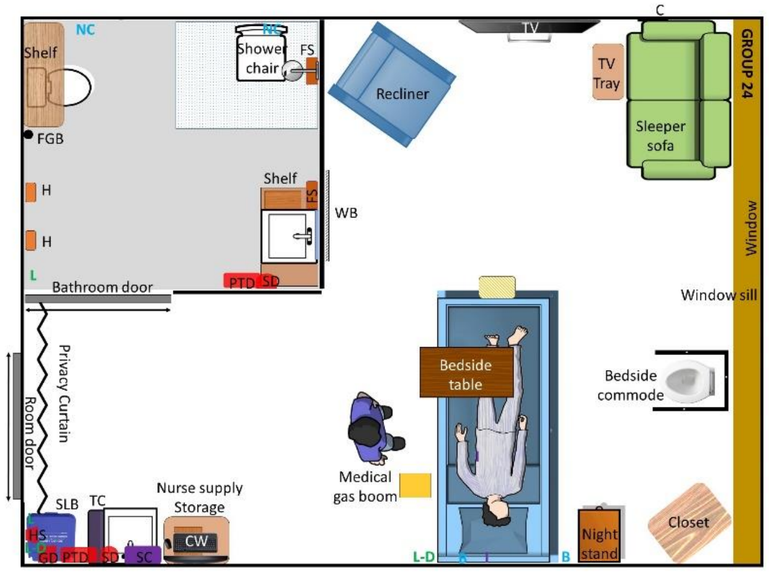
(b) Group 13



(c) Group 22

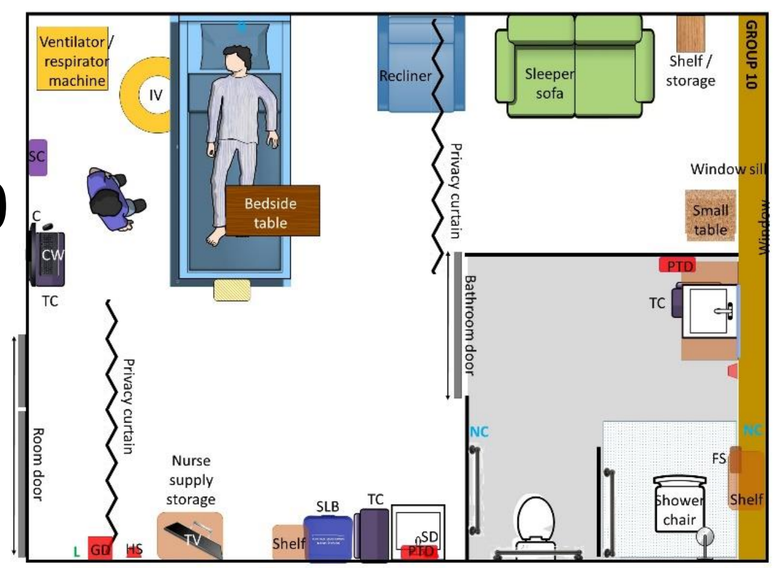


(d) Group 24

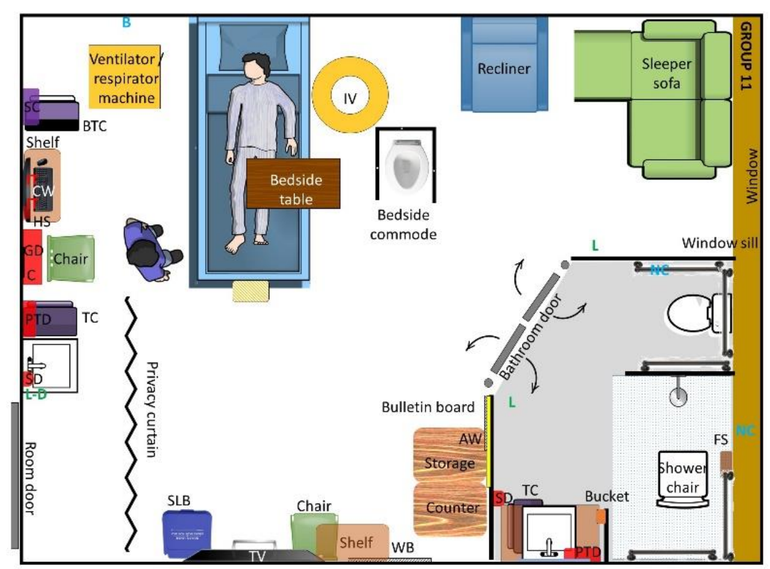


Bed offset from corner door with outboard bathroom

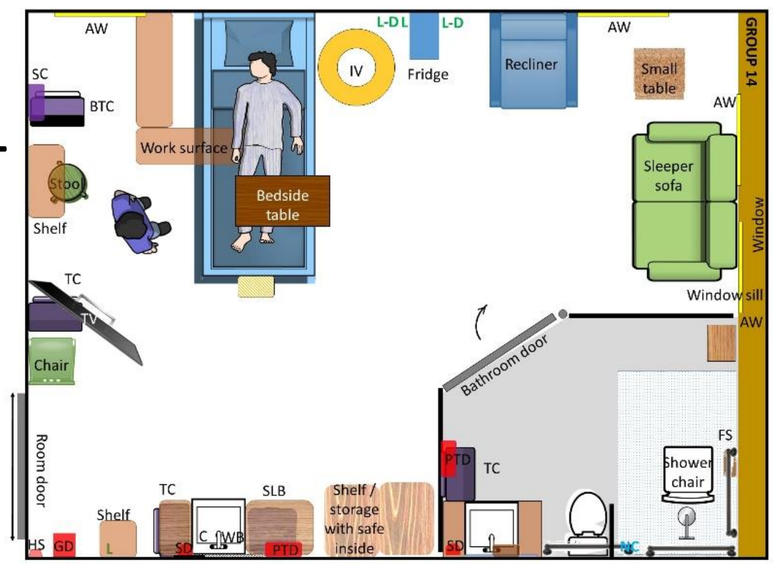
(a) Group 10



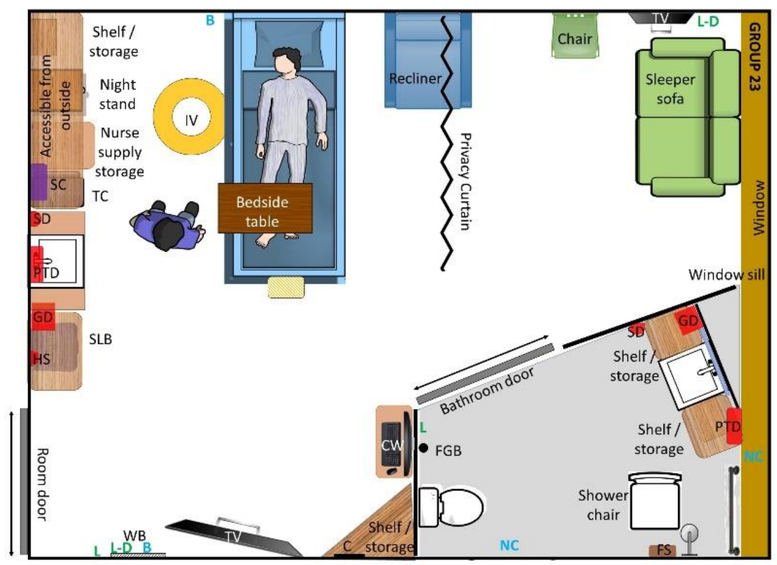
(b) Group 11



(c) Group 14

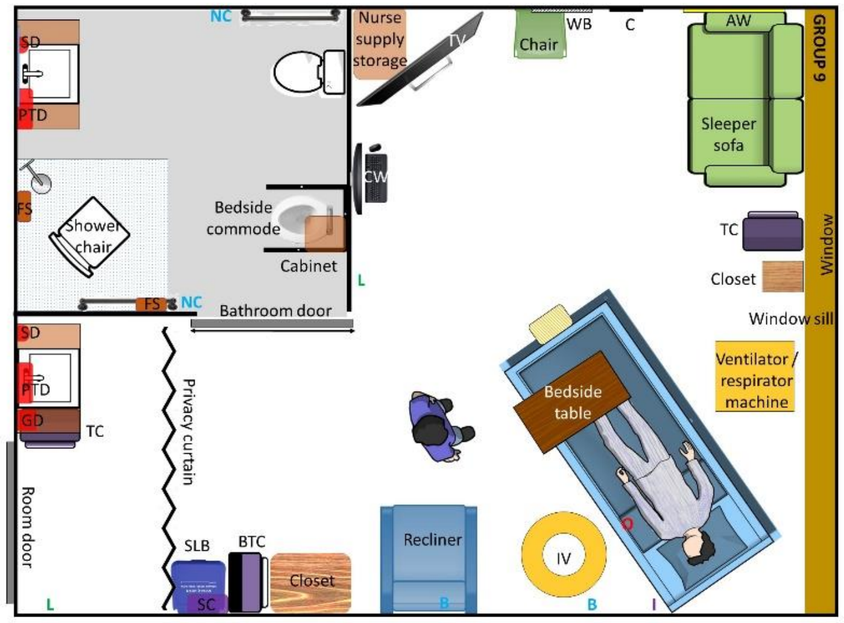


(d) Group 23

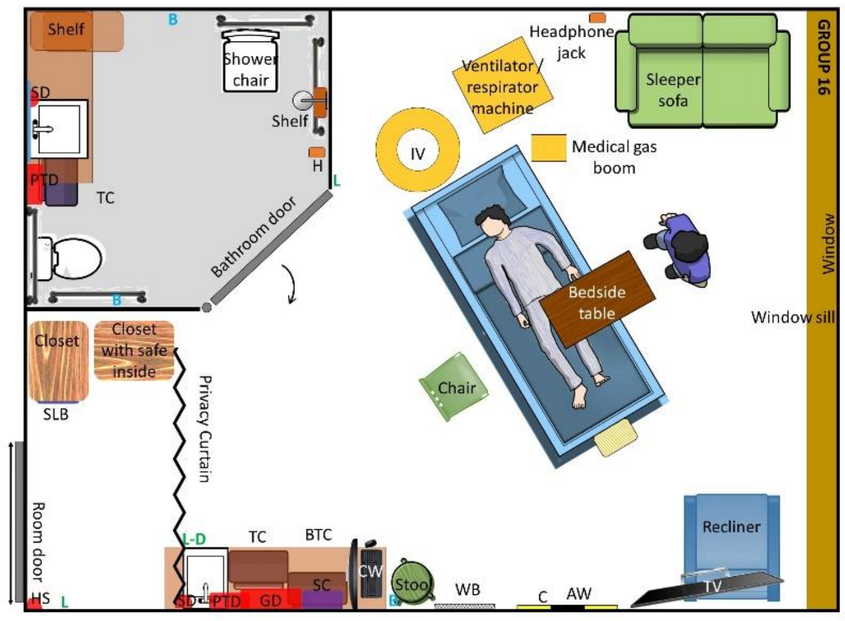


Bed angled with inboard bathroom

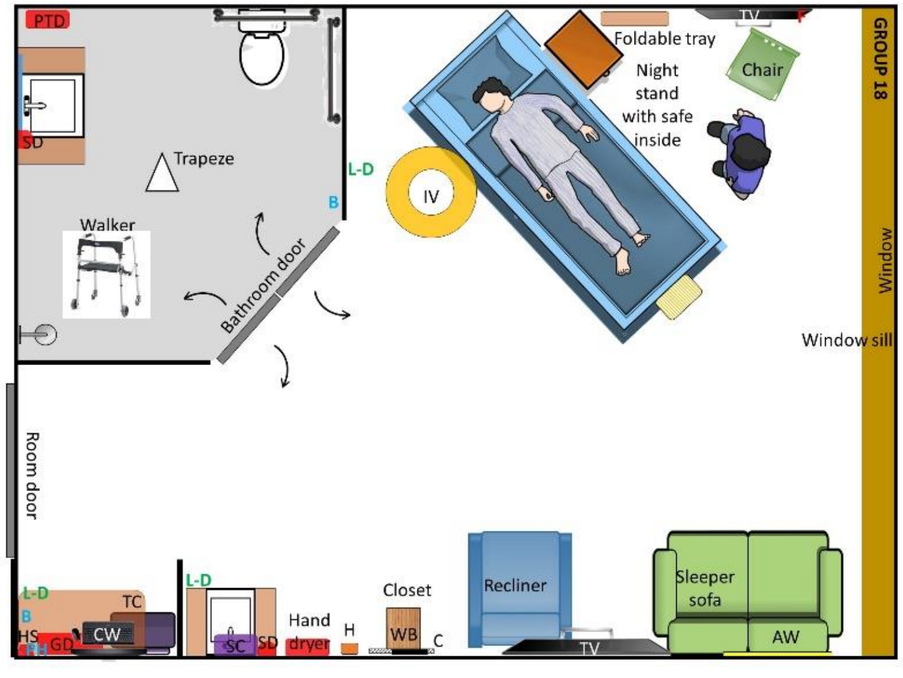
(a) Group 9



(b) Group 16



(c) Group 18

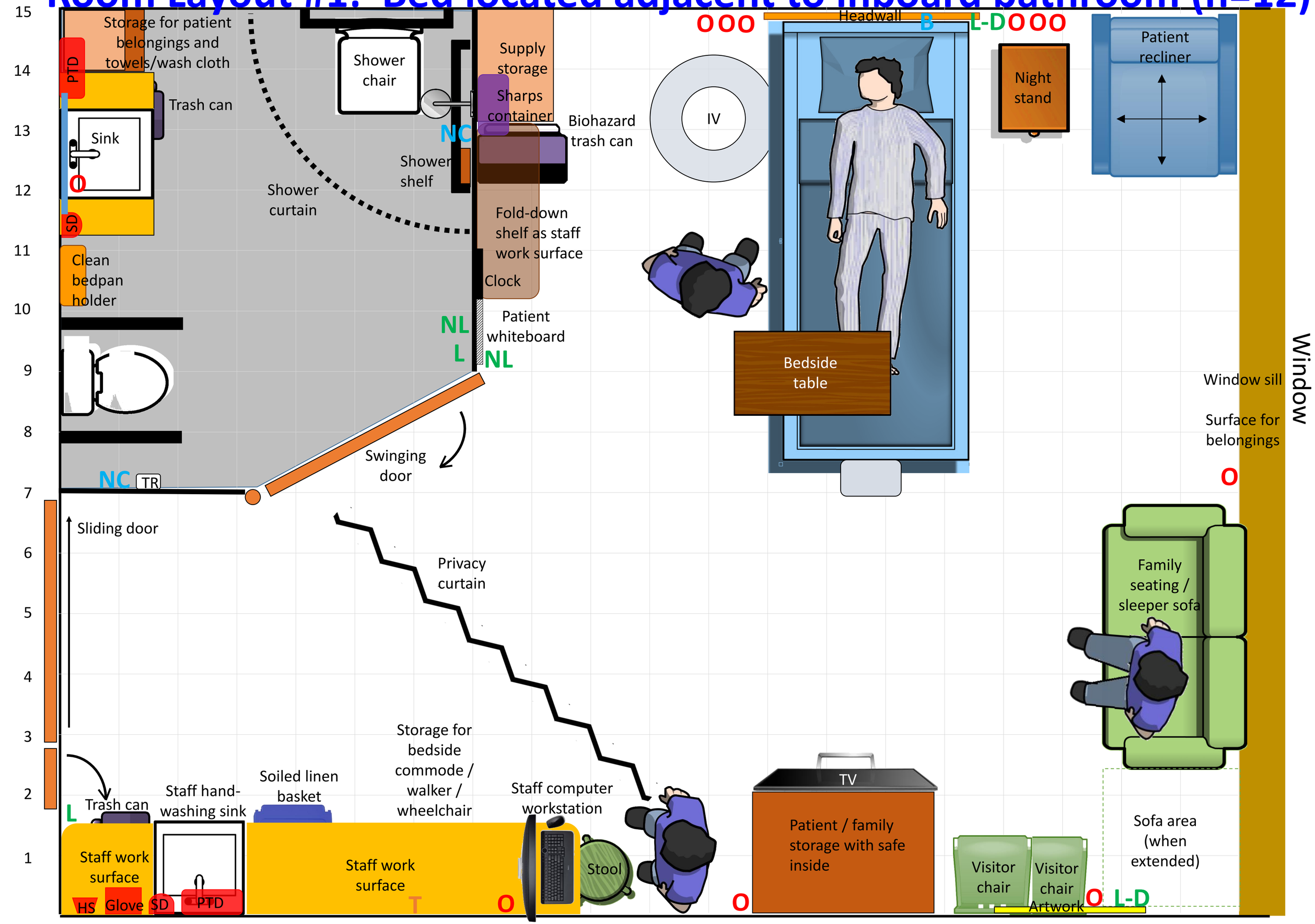


Clustering process

- 27 sessions = 27 Room Layouts
  - Unique features in each room!

- Designs clustered based on:
  - bathroom location,
  - bed location/orientation
  - Family zone location

Room Layout #1: Bed located adjacent to inboard bathroom (n=12)



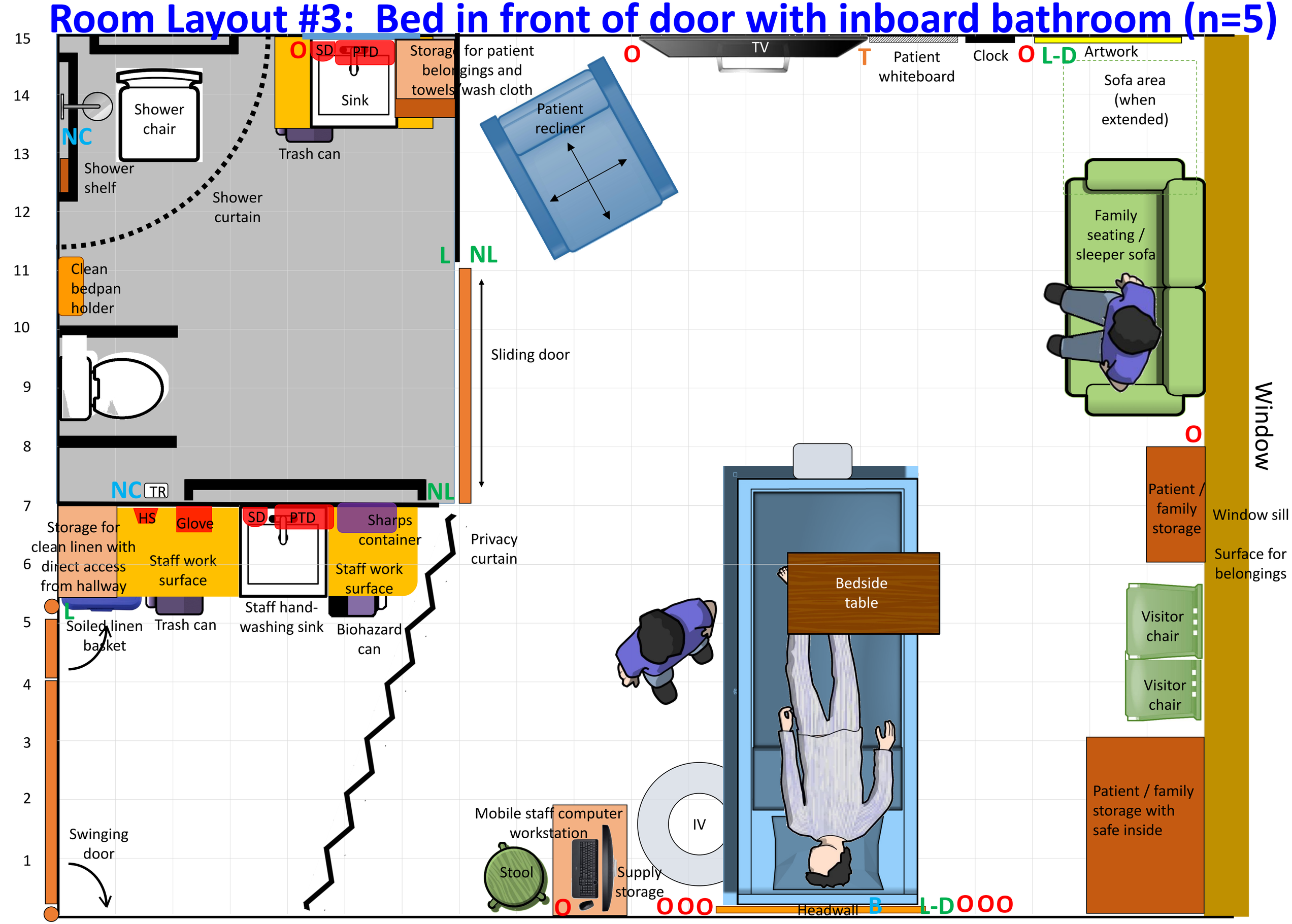
Room Layout #2: Bed inboard with outboard bathroom (n=5)

Supply storage
Sharps container
Soiled linen basket
HS
Storage for bedside commode / walker / wheelchair
Staff work surface
Biohazard trash can
Glove
Trash can
PTD
SD
L
Staff hand-washing sink
Sliding door
Privacy curtain
TO
TV
Stool
Clock
O
Staff computer workstation
Patient whiteboard
Patient / family storage with safe inside
OOO
Headwall
B
OOO L-D
Bedside table
IV
Patient recliner
Artwork
Visitor chair
Visitor chair
O
L-D
TV
Family seating / sleeper sofa
Privacy curtain
Window
Window sill
O
Surface for belongings
Storage for towels/wash cloth
Storage for patient belongings
PTD
NL
Trash can
Sink
SD
O
Sliding door
L
NL
Shower curtain
Shower chair
Clean bedpan holder
Shower shelf
NC
TR
NC
High window

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Room Layout #3: Bed in front of door with inboard bathroom (n=5)



Room Layout #4: Angled bed with inboard bathroom (n=3)

Shower chair
NC
Shower shelf
Shower curtain
NC
TR
O
Staff work surface
Clean bedpan holder
NL
L
NL
PTD
Trash can
O
Sink
SD
Storage for patient belongings and towels/wash cloth
Swinging door
L-D
Medical gas boom
O O O
O O O
B
IV
Bedside table
L-D O
Family seating / sleeper sofa
Sofa area (when extended)
O
Window
Window sill
Surface for belongings
Sliding door
Privacy curtain
Patient recliner
O
Soiled linen basket
Trash can
Biohazard trash can
Staff hand-washing sink
Staff computer workstation
Stool
L
HS
Staff work surface
Glove
SD
PTD
O
Sharps container
Supply storage
O
Patient whiteboard
T
Clock
Visitor chair
Visitor chair
Artwork
TV
Patient / family storage with safe inside

Room Layout #5: Inboard Bed, mid-room door, outboard bathroom (n=2)

Clock
T
TV
O
Surface for patient / family use
Patient / family storage with safe inside
NC
TR
NC
Shower shelf
Shower chair
Staff work surface
Soiled linen basket
Storage for bedside commode / walker / wheelchair
Shower curtain
Supply storage
Stool
Clean bedpan holder
Sliding door
High window
Sliding door
Storage for patient belongings and towels/wash cloth
Patient whiteboard
Trash can
Observation window with 2-way control
Sink
L NL
O
PTD
SD
NL
O
Window sill
Bedside table
Sofa area (when extended)
Surface for belongings
L
SH
SD
PTD
Glove
Staff hand-washing sink
Trash can
Biohazard trash can
Sharps container
Mobile staff computer workstation
Staff work surface
Supply storage
O
O O O
Headwall
B
IV
L-D O O O
Patient recliner
Visitor chair
Visitor chair
Artwork
L-D
O
Family seating / sleeper sofa
Window
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Phase III

Assess the needs of patients and their visitors

Methods

Study participants:

- 3-day stay in med-surg in last 12 months as patient/family
- 15 evaluation sessions
- **61 participants** (37 patients, 24 family caregivers)

Data collection:

- **Walkthrough** (2 rooms) and audio-recorded reactions
- Written survey
- Audio-recorded **“likes and dislikes”** discussion

Data analysis:

- Calculate survey question frequency, median values
- Straussian approach to grounded theory analysis

Patient Needs and Expectations

- A **single patient room** that is adequately sized, comfortable, and comforting for patient and visitors.
- Desire to be in an **uplifting environment** that is conducive to rest/sleep
- A room that accommodates patient's physical limitations.
- An **entry way** design that:
  - Affords control over **visual privacy** and hallway noise
  - Enables patient to **see who is entering** the room
- Able to have **private conversations** with clinical staff when needed.

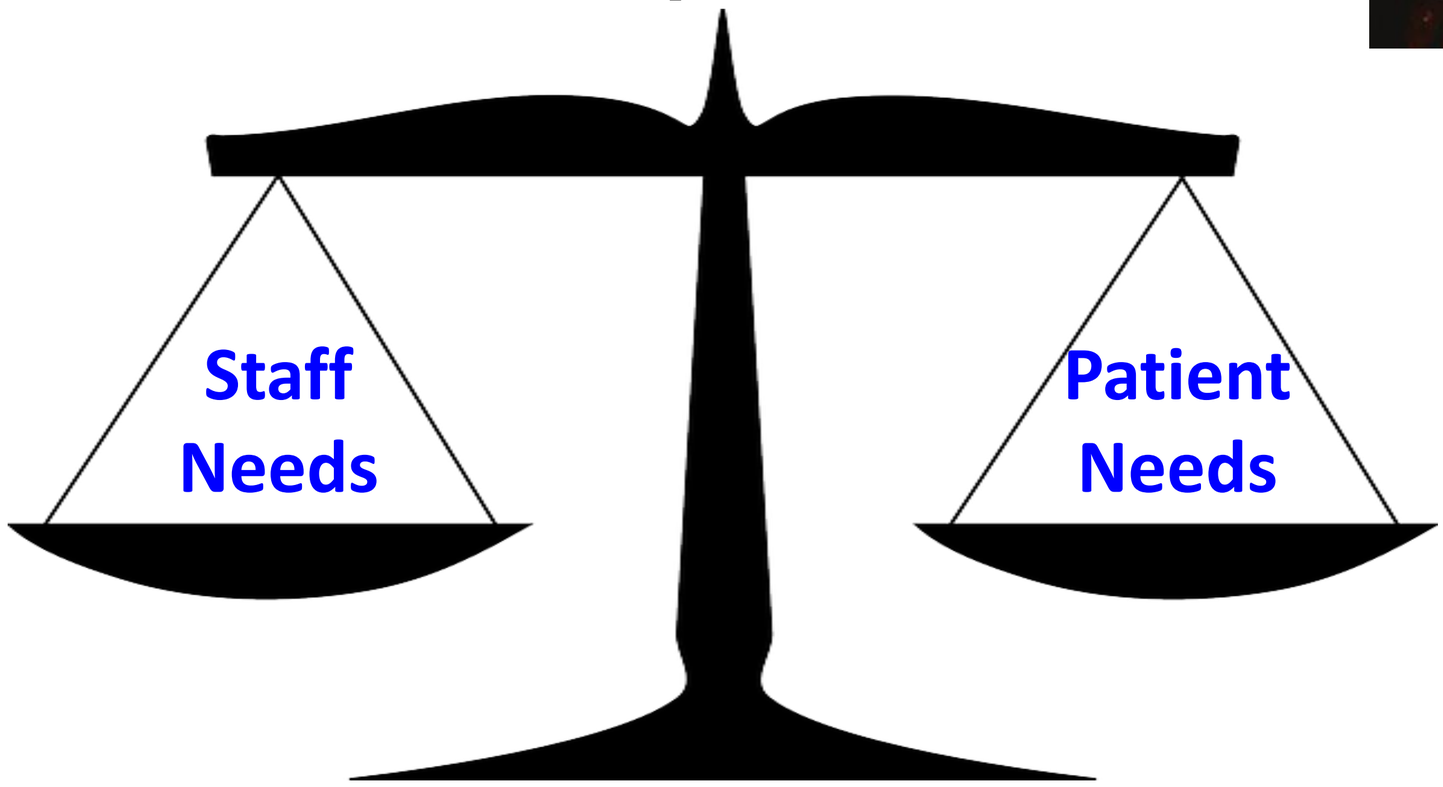
Patient Needs and Expectations

- **Easy access to**:
  - Power: many accessible electrical outlets
  - Entertainment
- **Means to easily control** the room environment (lighting, temperature, window coverings)
- **Organized places for the patient to put things**
  - Visible and secure patient storage within reach or view:
  - A place to display items (cards, photos, flowers, etc.)
  - A clean place for personal items
- **A close bathroom** that is easy to access, even with IV pole, wheelchair, walker, etc.
  - Safe toilet access day and night
  - Barrier-free shower access
  - Privacy in the bathroom

Patient Satisfaction

Improving Patient Satisfaction is anticipated to:

- Increase scores on 13/18 HCAHPS survey questions
- Promote healing process by reducing stress/anxiety
- **Reduce demands on hospital staff**



Phase IV

Room Review and Conflict Resolution

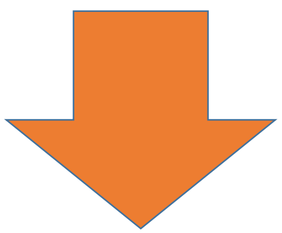
Room Review Sessions with Hospital Staff

- Identified conflicts
  - Between occupational stakeholder groups
  - Between patients/visitors and occupational stakeholder groups
- Validated room design concepts.

Stakeholder / Group	n
Case manager	1
Diet tech	3
Imaging	8
MD	5
Housekeeper	12
Iinterior designer	1
Nnurse	6
Nutrition aide	1
OT / PT	6
Patient care assistant (PCA)	10
Respiratory therapist (RT)	5
Sitter (safety care associate (SCA))	4
Social worker	4
Speech language pathologist (SLP)	3
Ttransporter	6
Total	75

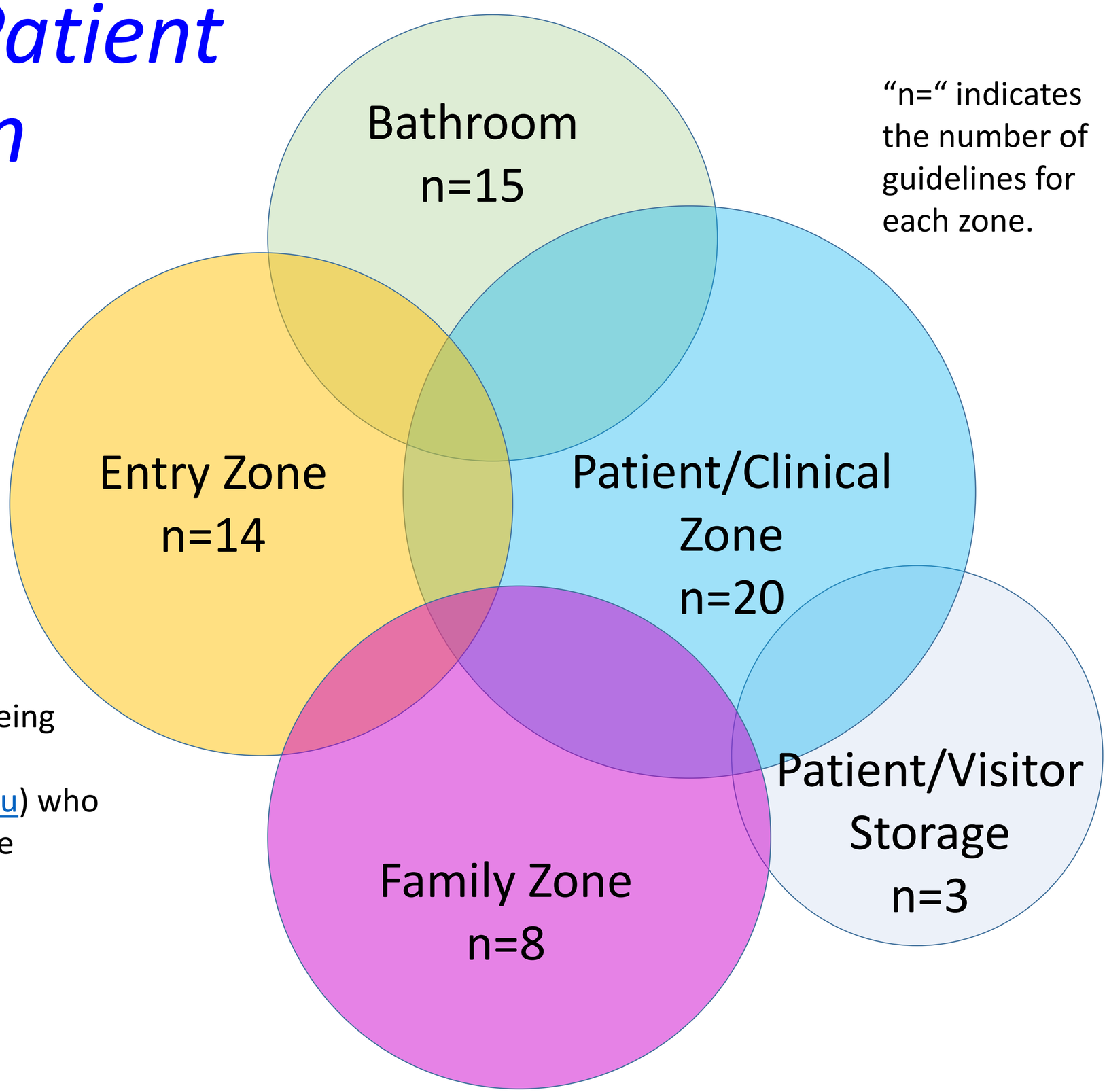
4 Phase Study Design

- **Phase 1:** Focus groups and interviews of all stakeholders
  - *How do room parameters facilitate or interfere with what you do in the room?*
- **Phase 2:** Build the room you would like to work in
- **Phase 3:** Assess the needs of patients and their visitors
- **Phase 4:** Resolve conflicts



Develop guidelines for architects and interior designers

Med/Surg. Patient Room Design Guidelines



"n=" indicates the number of guidelines for each zone.

These guidelines are currently being refined. Please contact the lead investigator (lavender.1@osu.edu) who will be very willing to share these guidelines with you.

Med/Surg. Patient Room Design Guidelines - Example

Primary Item	Secondary Item	Design Recommendation	Constraints	Why (staff)	Why (patient)
Biohazard Container	Room Door	Space should be allocated for a biohazard container near the room door.	• Dedicated space has to be large enough to accommodate containers holding isolation apparel and procedural materials • Container cannot obstruct the entry way.	• Staff needs to dispose of personal protective equipment (PPE) as they exit the room. • Cleaners wants to be able to empty waste without disturbing the patient. • Staff brining equipment in/out of the room do not want obstructions in the path of travel.	•Patients do not want to be disturbed when waste is removed from the room.

Summary

- Many different types of stakeholders were identified that work in patient rooms.
  - Each has unique needs that determine how these people will work in the space.
- The room design process identified many design features that would enhance the work process and address many of the ergonomic issues that exist in current rooms.
- Final design recommendations are currently being developed and refined.

Team Effort

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- Jing Li
- Radin Umar
- Sanghyun Park

Questions?

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