Investigating Infection Control Behavior in Nurses
Determinants of donning and doffing behaviors

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Study Overview

The successful completion of this mixed method study will allow us to better understand the use of PPE by nursing staff. It utilizes an inexpensive simulation method which keeps legal and ethical concerns in healthcare to a minimum while uncovering poorly understood human behaviors. This study will expand our previous pilot work (Beam, et al., 2011) for scoring proper PPE use in healthcare workers. Nurses were selected for this initial work because of the frequency with which they provide bedside care in the hospital setting.

Hypothesis

Performance of clinical skills by nurses related to infection control procedures in a simulated environment will increase compliance to clinical standards which will be maintained upon returning to the clinical environment after an extended period of time after the simulation experience.

Theory: Reflective Practice (Donald Schön)

Specific Aims

Specific Aim #1
Identify infection control behaviors by nurses which may or may not adhere to clinical standards for isolation practice while performing clinical skills in a simulated patient care environment.

Specific Aim #2
Describe participant rationales for the various infection control behaviors which deviate from standards followed by individual reflections on performance in comparison to the CDC guidelines for isolation care.

Specific Aim #3
Explore the timing of changes in clinical infection control behaviors after simulation participation over an extended period of time.

Study Design

Population: Registered Nurses expected to care for patients in isolation in an Academic Healthcare System who work at least part–time.
Sample Size: 24

Simulation Experience:

Video Record Patient Care + Review video with 'Think Aloud' Recording
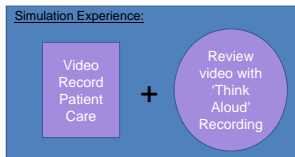
Post-simulation data: Collect demographic information, occupational history, and physical characteristics/flexibility assessment.
Sequential Explanatory Design: Simulation reviewed and scored by study team(as per Beam, et al., 2011). Think Aloud recordings qualitatively analyzed.
Long Term Follow Up (at One Month): Emailed questionnaire asking about change in practice.

Early Findings: Infection Control Behaviors

Quality of Donning	Met	Not Met
Perform hand washing	21	3
Gown right side out	14	10
Tie gown at neck and waist	6	18
Ties done in bow (secure but easy to untie)	8	16
Don N95 Respirator	24	0
Seal N95 Respirator (fit snug to face and below chin)	10	14
Fit-check the N95 Respirator	0	24
Respirator straps positioned correctly (crown of head, base of neck)	12	12
Don eye protection	2	22
Don gloves with gown cuffs under the glove covering wrist of isolation gown	16	8

| In Room Activities	Yes	No
Touch their face or other non-protected areas of body with gloves	4	20
Gap develops between gown cuff and glove	9	15
Performed unnecessary/unwarranted touching of the environment	3	21
Adjust N95 Respirator (breaking the seal) or other PPE	9	15
Unprotected areas of body in contact with potentially contaminated surfaces or objects in the room (ex. Stethoscope)	22	2

Quality of Doffing	Met	Not Met
Remove gloves using glove-in-glove technique	12	12
Dispose of gloves properly	21	3
Remove eye protection without touching face	3	0
Reusable eye protection placed in the contaminated area	0	3
Untie gown and remove by grasping gown at shoulders	5	19
Remove gown by slowly pulling it down, rolling inside out to form a bundle and keeping gown close to body	6	18
Open laundry hamper using foot pedal	7	17
Place entire gown into laundry hamper	24	0
Remove respirator by grasping elastics at the back of the head and moving them forward.	5	19
Dispose of respirator in garbage	24	0
Use of hand sanitizer available before touching door to exit	5	19
Perform hand washing/hygiene	20	4

Common "Think Aloud" Comments on Clinical Challenges

Code examples	# of comments *
Respirator discomforts	4
Vision challenges	3
Gown challenges	24
Patient care concerns prioritized over infection control processes	3
Paranoid about isolation/infection	4
Access to eye protection	6
Recognizes need for N95 fit	32
Rarely fasten lower gown tie in practice	10

*These were individual comments. One participant may have commented multiple times.

Simulation Layout
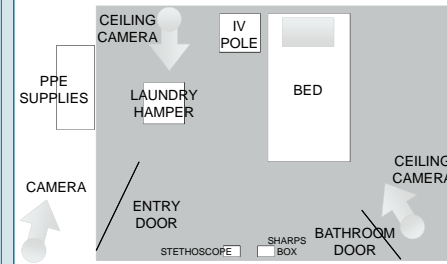
Video and Data Capture

DSLR & GoPro Cameras
  - Exterior and In-room views
Audio Recording
  - For "Think Aloud" (Ericsson & Simon)
Data Storage
  - Challenges: encryption, file size

Demographics

- 3 male; 21 female
- 22 White, 2 Asian
- Birth year range: 1952-1989
- 10 of 24 with history of blood borne pathogen exposure
- Various units.

Potential Outcomes

Do we need to teach and evaluate learning on infection control behaviors differently?
- This study will be a basis for future work on behavior change utilizing more complex test/re-test designs.

Consider development of detailed guidelines for individual PPE items.
- Many safety concepts are misunderstood.

Are more innovative PPE designs needed for healthcare?
- Small changes might alter performance.

Further Analysis Needed

- Look at the context of certain errors with "Think Aloud" interviews (examine intention).
- Eye protection: What is the best process for doffing/cleaning eyewear? Does our current grading system need adjustment?
- Investigate two obvious relationships/consequences:
  - Respirator application and in-room N95 adjustment
  - Gown donning and in-room contamination

Pilot Work Reference

Beam, E., Gibbs, S., Boulter, K., Beckerdite, M., & Smith, P. (2011). A method for evaluating personal protective equipment technique by healthcare workers. American Journal of Infection Control, 39, 415-420.

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Investigating infection control behavior in nurses: Determinants of donning and doffing errors

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ABSTRACT: In a small mixed methods study, nursing behaviors related to infection control were evaluated as nurses participated in a video recorded patient care simulation. The scenario asked the nurse to care for a patient in both airborne and contact isolation precautions with small high definition cameras mounted in a real hospital room. The patient was simulated by a live actor with an artificial intravenous line. The simulation scenario asked the nurse to assess their patient and give them some pain medication. The simulation experience was followed by a Think Aloud session while participants watched their individual simulation performance. The session was audio recorded and then transcribed for qualitative analysis. In an effort to determine how physical restrictions or personal characteristics impacted nursing behaviors, participants were asked to complete a demographic survey and complete a range of motion demonstration in front of a video camera before the study session ended. Nursing behaviors noted in the video recordings and insights from the nurses in the Think Aloud sessions will be reviewed in relation to these determinants of behavior. Frequent errors in donning and doffing occur in spite of personal experiences with exposure. The errors seen in most participants did not correlate with range of motion issues such as joint mobility or flexibility. Educational interventions for nurses at the bedside may need to address common misconceptions in isolation care processes.

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