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Animal Assisted Interactions with an Animal Robot During Physical and Occupational Therapy Sessions in the Pediatric ICU: A Feasibility Study

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Introduction

The highly technical, fast-paced intensive care unit (ICU) environment and the severely immunocompromised health statuses of ICU patients greatly limits the exploration of animal assisted interactions (AAI) in the ICU. A new frontier in animal robotics opens a vast array of opportunities to implement AAI in the critically-ill population.

Purpose

1. Establish the feasibility and acceptability of PARO™ for patients admitted to the ICU
2. Examine the therapeutic effect of PARO™ on patient psychological variables

Methods

Design: single-arm, quasi-experimental, pretest-posttest exploratory study

Sample: 30 critically-ill pediatric patients will be recruited from a single PICU at Nebraska Medicine

Intervention: PARO™ is an advanced interactive, therapeutic medical robot able to perceive people and its environment in real time. For this study, the physical therapist and/or occupational therapist is responsible for directing the therapy session with PARO™ . The following skills will be targeted at the PT/OT's discretion: speech, memory, fine motor skills, balance and endurance, self-esteem, and sensory stimulation.

Measures:

- Patient Demographics
- Pre/post Session Variables
  - Vital signs
  - Pain
  - Anxiety
- Therapy Session Activities (Activity Performance Form)
- Intervention Acceptability (Post Study Interview)

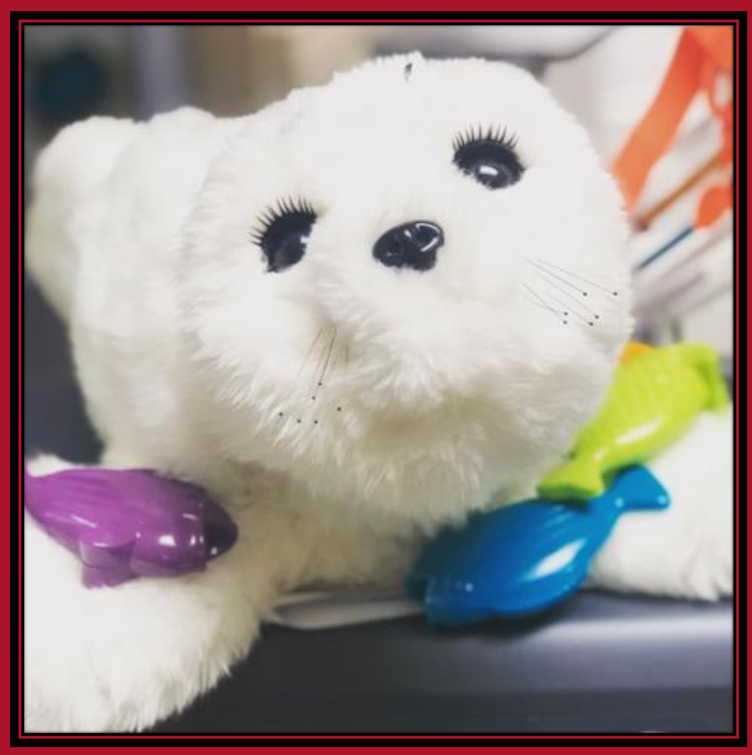
Procedures: Vital signs, anxiety, and pain are assessed 5 minutes prior/5 minutes after the session. Field notes are taken by research staff during the session. Subjects remain in the study for up to 7 sessions or until they are discharged from the PICU. A qualitative interview is conducted upon study completion.

Preliminary Results (N=10)

Demographics

Age in years	Range: 5-17 M (SD) = 11.1 (4.1)
Gender	8 male 2 female
Race/Ethnicity	5 Caucasian 3 African American 2 Hispanic
Pediatric Risk of Mortality at Time of Study Enrollment PRISM III Range (0 to ≥20)	M (SD) = 10.2 (8.9)

Robot animals can and should be used to promote patient physical and psychological wellbeing during rehabilitation sessions in the pediatric ICU



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Physiological Variables, Pain, & Anxiety Pre-Post Session

Variable	M (SD)	Std. Error Mean	t	df	Sig (2-tailed)
Heart Rate	-1.3 (14.1)	4.47	-0.29	9	.78
Systolic Blood Pressure	0.9 (4.7)	1.50	0.60	9	.56
Diastolic Blood Pressure	-2.1 (5.3)	1.75	-1.21	8	.26
Respiratory Rate	-5.3 (17.1)	5.43	-0.98	9	.36
Oxygen Saturation	-0.3 (1.8)	0.58	-0.52	9	.62
Anxiety	-0.2 (2.1)	0.74	-0.25	7	.81
Pain	-0.5 (1.8)	0.63	-0.80	7	.45

Therapy Session Activity Details

10 subjects have undergone (n=26) distinct therapy sessions
Session Length in Minutes: M=33.2; SD=7.7
Number of Sessions per Subject: M=2.6; SD=1.3

Speech (n=25)	No. (%)	Balance and Endurance (n=26)	No. (%)
Calling Paro's name	20 (80)	Reaching to Paro from Left to Right	15 (58)
Clapping hands to get Paro's attention	6 (24)	Moving Paro from one surface to another	19 (76)
Using voice to talk to Paro	17 (68)	Pushing Paro while Paro is in a cart	7 (27)
Telling Paro Stories	15 (60)	Walking while holding Paro	3 (12)
Memory (n=23)	**No. (%)**	**Self-Esteem (n=26)**	**No. (%)**
Remember Paro's name, species	22 (96)	Paro's total acceptance of disability and/or appearance	24 (92)
		Empowerment in getting a response to movement or voice	25 (96)
Participating in activities with a Paro picture book	4 (17)	Increased social interaction with others because of Paro	22 (85)
Fine Motor (n=25)	**No. (%)**	**Sensory Stimulation (n=19)**	**No. (%)**
Petting, Brushing, Feeding	24 (96)	Feeling fur and body warmth	19 (100)
Dressing, Undressing	12 (48)	Feeling flippers, tail, nose, feet, nails, ears, etc	11 (58)
Cleaning	4 (16)	Hearing barking and other vocalizations	11 (50)

Post Study Interview Responses

Question	Subject Responses
What did you like most about the seal?	• It was different form the normal • It made me feel calm • It moved
What activity did you like doing most with the seal?	• Fishing • Dancing • Decorating it • Walking walk holding it • Touching and petting it
Was the seal fun?	• Yes, it made me distracted at took the pain away • Yes, it was different • Yes, it was fun to have a pet • Of course because it helped me calm down and was so cuddly and cute • Yes, it made getting up fun • I liked that it made sounds and turned its head

Conclusions

Preliminary results indicate that robot animals are feasible and acceptable to use during rehabilitation sessions in the pediatric ICU. No significant changes in physchophysiologic variables before and after sessions have been noted to date. Overall, subject reflections of the intervention have been positive.

The results from this study guide future studies involving this novel intervention in the ICU. Data from this exploratory study will be used to support future extramurally funded clinical trials using PARO™ in the PICU.

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