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Piloting The Use of Social Robot in Engaging Patients Physically and Socially

Li Fuyin, APN Geriatric Medicine
Wang Xia, Surgery

Irene Ang, Patient Experience Transformation
Si Ching Lim, Senior Consultant Geriatrician



Changi General Hospital
SingHealth

Abstract

The elderly >65 occupy most of the beds in acute hospitals and this trend will likely increase in the years to come. The elderly face potentially serious complications during their stay in the hospital with complications such as functional decline, delirium, falls, etc. The care teams are often busy due to rapid patient turnover. Getting the patients out of bed to participate in meaningful activities to keep them physically, socially and cognitively active often remain a challenge. The team explores novel method of getting patients engaged with a social robot with good results observed among the caregivers and patients. Patients were able to engage actively, resulting in improvement in mood and behavioural symptoms. The nurses were encouraged by the patients' participation during therapy sessions.

Aims of project

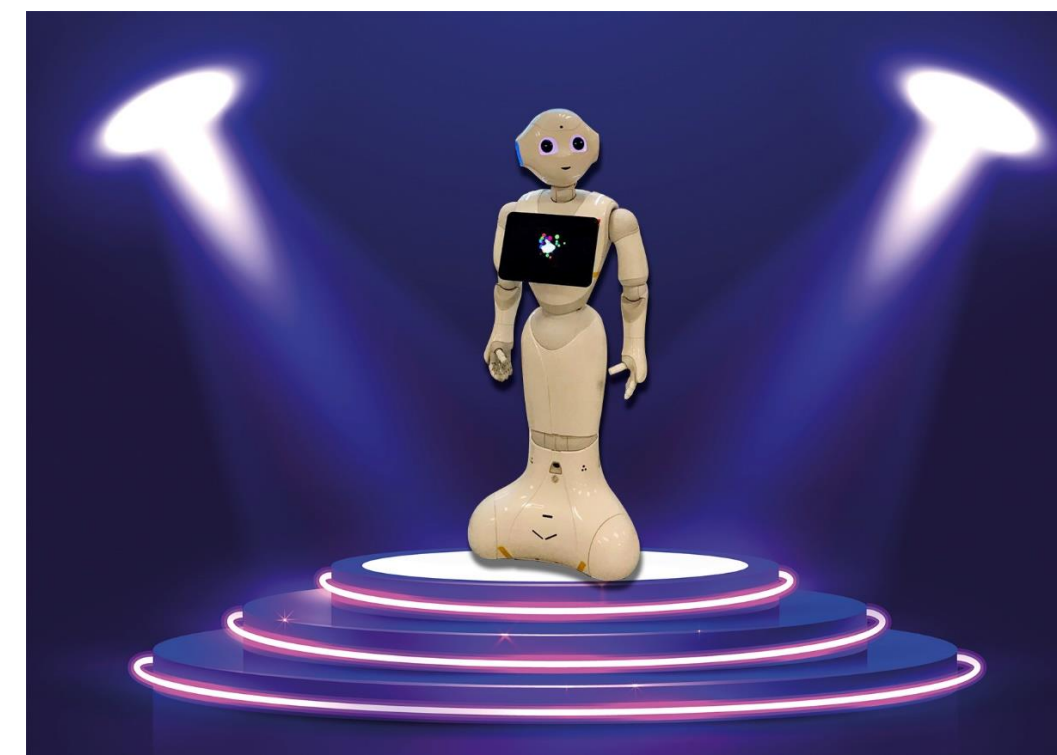
- Reduce risk of functional decline due to long periods of bed rest during hospital stay, by participating in light exercises led by robot.
- Engage patients socially to improve patients' mood and reduce loneliness due to social isolation.
- Provide cognitive stimulation to reduce delirium risk.
- Reduce nurses' care burden.
- Improve patient experience using a novel method of engagement.

Introduction

Currently in Changi General Hospital (CGH), there are 1066 beds, among which >60% are occupied by an older patient aged >65. The older patients have complex needs compared to the younger patients, especially the patients living with dementia. Most of the patients in the hospitals spend the majority of time lying in bed with no activities planned for their days. Bed rest during hospitalisation is associated with decline in basic activities of daily living in up to 55% of the elderly, with up to 65% demonstrated a decline in their ambulation. (1,2) Functional decline is a predictor of nursing home placement. (3) This will put a tremendous strain on our healthcare resources and nursing home beds as Singapore faces the silver tsunami.

The ageing process causes a loss in muscle mass and strength, otherwise known as sarcopenia. Sarcopenia is associated with physical disability, reduced quality of life and death. (4) Prolonged bed rest/ immobility causes further loss in muscle strength among the elderly. Comparing with the younger adults, the older patients are more likely to lose muscle mass and strength during periods of immobility. Healthy older adults lose almost 1kg of lean body mass after 10 days of hospital stay, with 16% decline in muscle strength. (5) These huge losses in muscle mass and strengths far exceed what was observed among younger adults at 14-28 days of bed rest. (6)

Prolonged bed rest and sensory deprivation due to lack of social interactions both increase risk of delirium. (7) In an acute hospital setting where every team member is busy with their tight schedule, CGH Team Geri explored innovative means to keep the patients active physically and mentally to reduce the risks of delirium and functional decline. The team chanced upon Pepper and decided to do a pilot among the inpatients in CGH for one month. The pilot study was to examine if Pepper was able to motivate the patients, both young and old, to participate in light exercises in the day.



Pepper was programmed with upbeat music from the yesteryears, light upper and lower limb exercises and reminiscence therapy.

Method

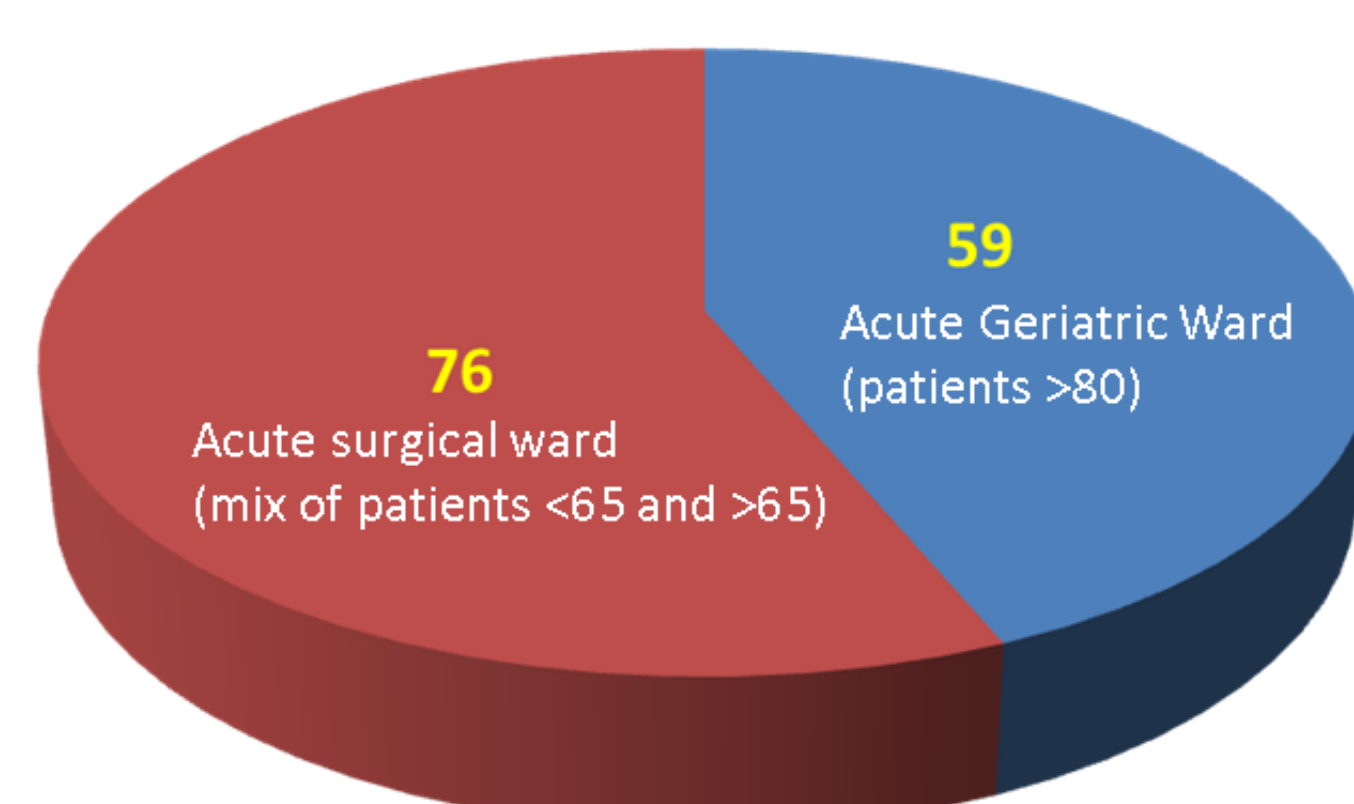
The engagement programme with the inpatients occurred at twice a week, for about an hour per session at 2 separate locations in CGH. Inclusion criteria are listed in Figure 2. The patients with poor attention span, physical aggression and inability to sit unassisted or consistently follow instructions were excluded.

The patients were mostly elderly, some with cognitive issues. There were also younger patients who did not have cognitive issues. The patients were asked if they wanted to participate and verbal consent was obtained prior to the sessions. For the older patients with cognitive issues, consent was obtained verbally from their next of kin. The patients were free to withdraw at any time during the therapy should they request to do so, or the staff felt they were no longer fit to continue. Pepper led the patients for simple upper and lower limb exercises while seated. Pepper also had a programme for reminiscence therapy, engaging the patients as a group.

Data collected included presence/absence of cognitive issues defined as delirium or dementia Outcome measures included examining the patients' agitation, restlessness, apathy, cognitive and patients' level of engagement physically and socially. Caregivers' satisfaction with the therapy sessions were also obtained.



Number of Patients



Total of 135 patients were enrolled over a month period. There were 76 patients recruited from the acute general geriatric wards, and 59 from the acute surgical ward (figure 1)

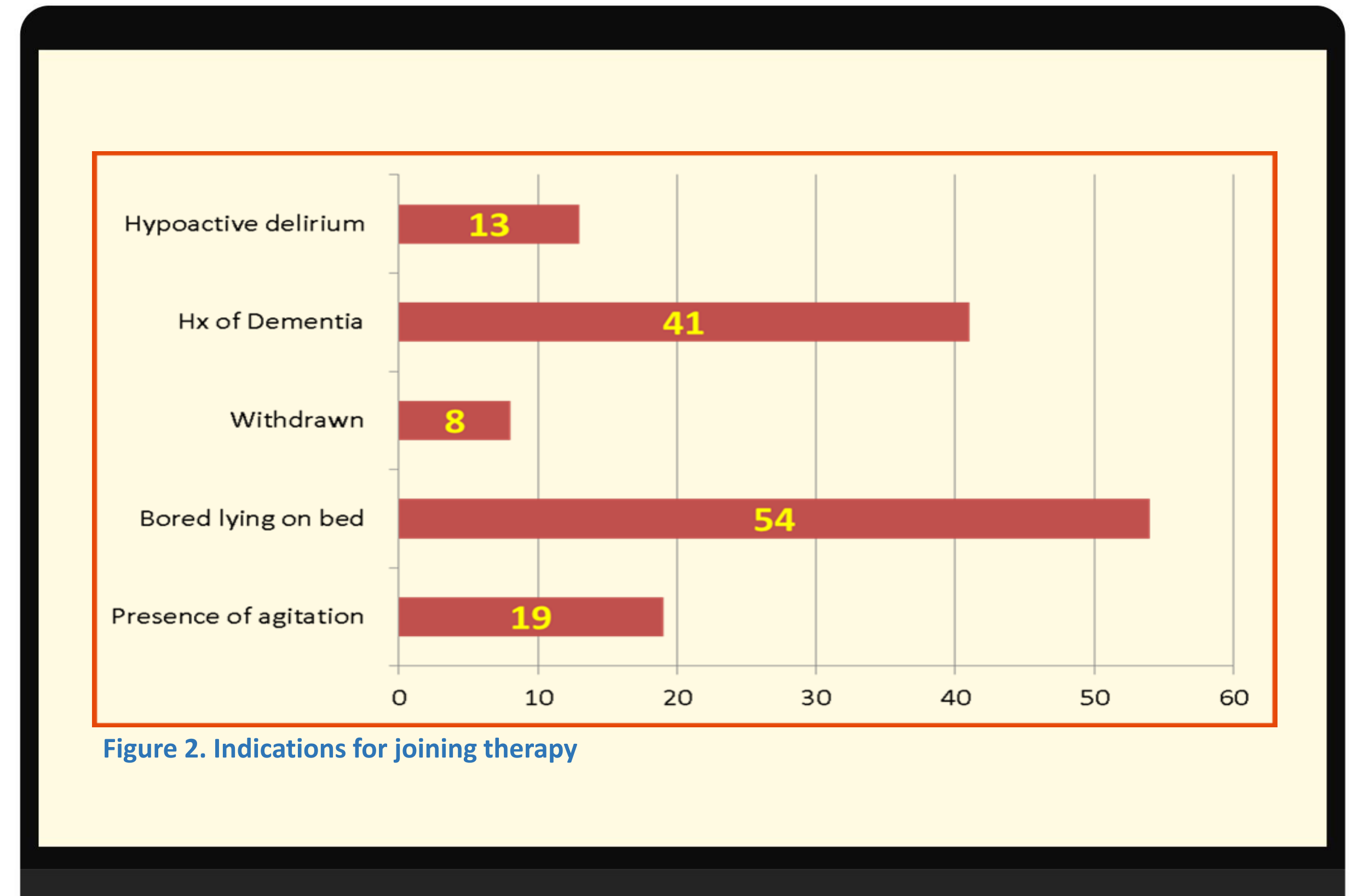


Figure 2. Indications for joining therapy

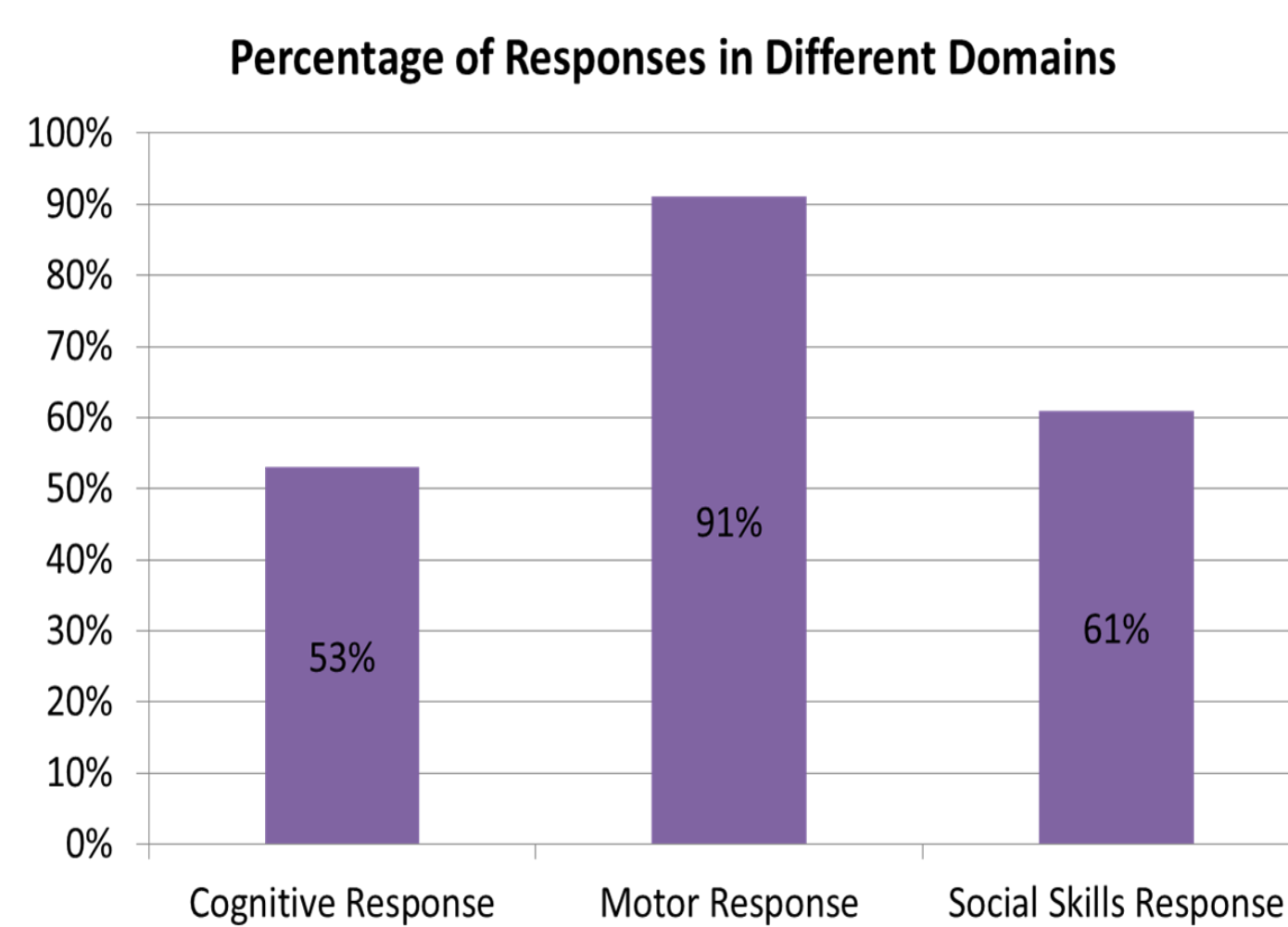


Figure 3- response to therapy.

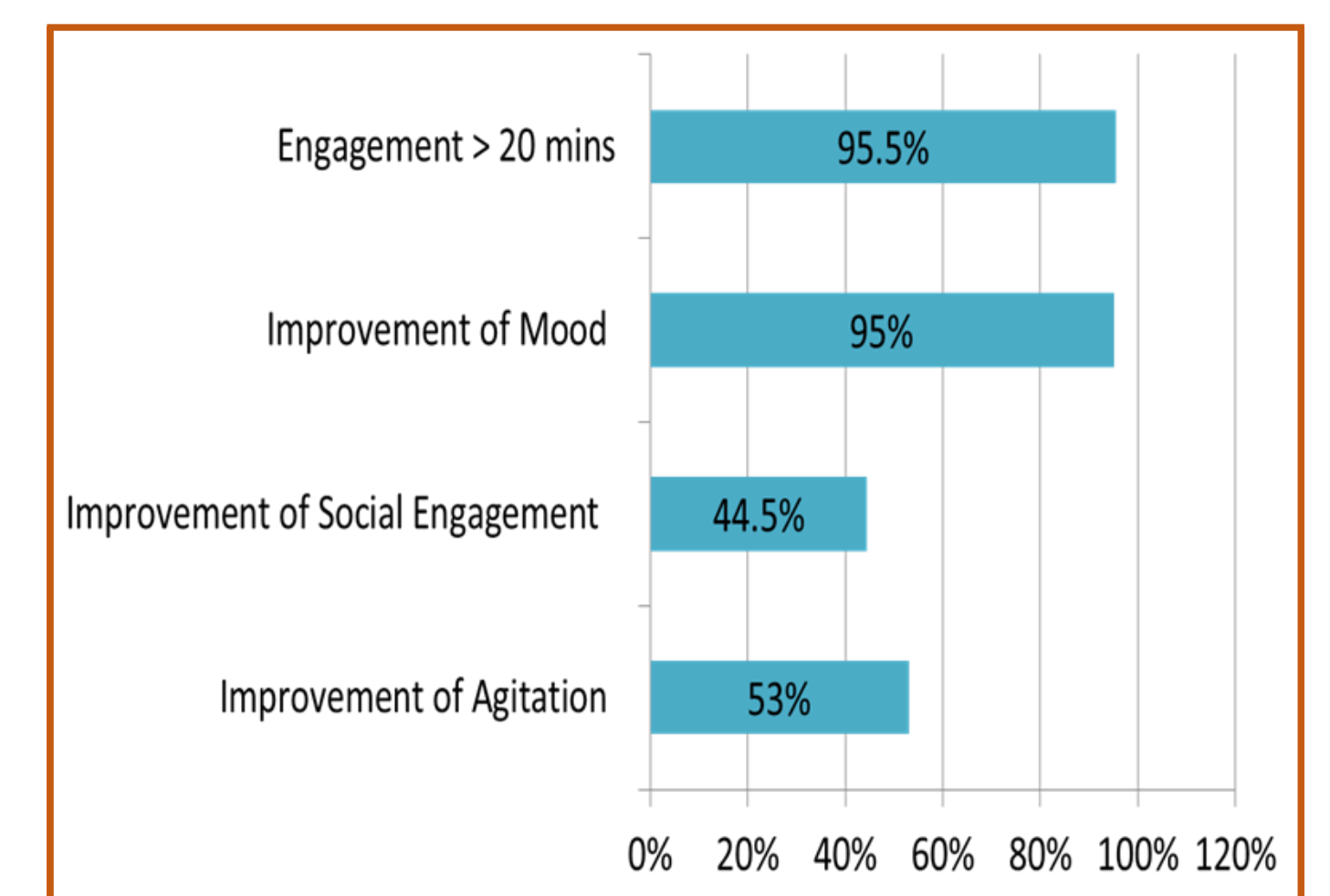


Figure 4. Patients' response as observed by staff

Most of the patients, 129 (95%) were able to engage for 30-60minutes of therapy. Response to therapy was assessed in terms of cognitive response, motor participation and social interactions (figure 3). Physical response was observed among 91% of the patients who actively participated in exercises, 61% showed social interactions with responses observed during reminiscence therapy; 53% showed response cognitively with answering questions posed by Pepper and some of the patients were actively discussing answers with the staff or patients present. Most of the patients (95%) showed improvement in mood during and after the therapy with concurrent improvement in agitation score (figure 4).

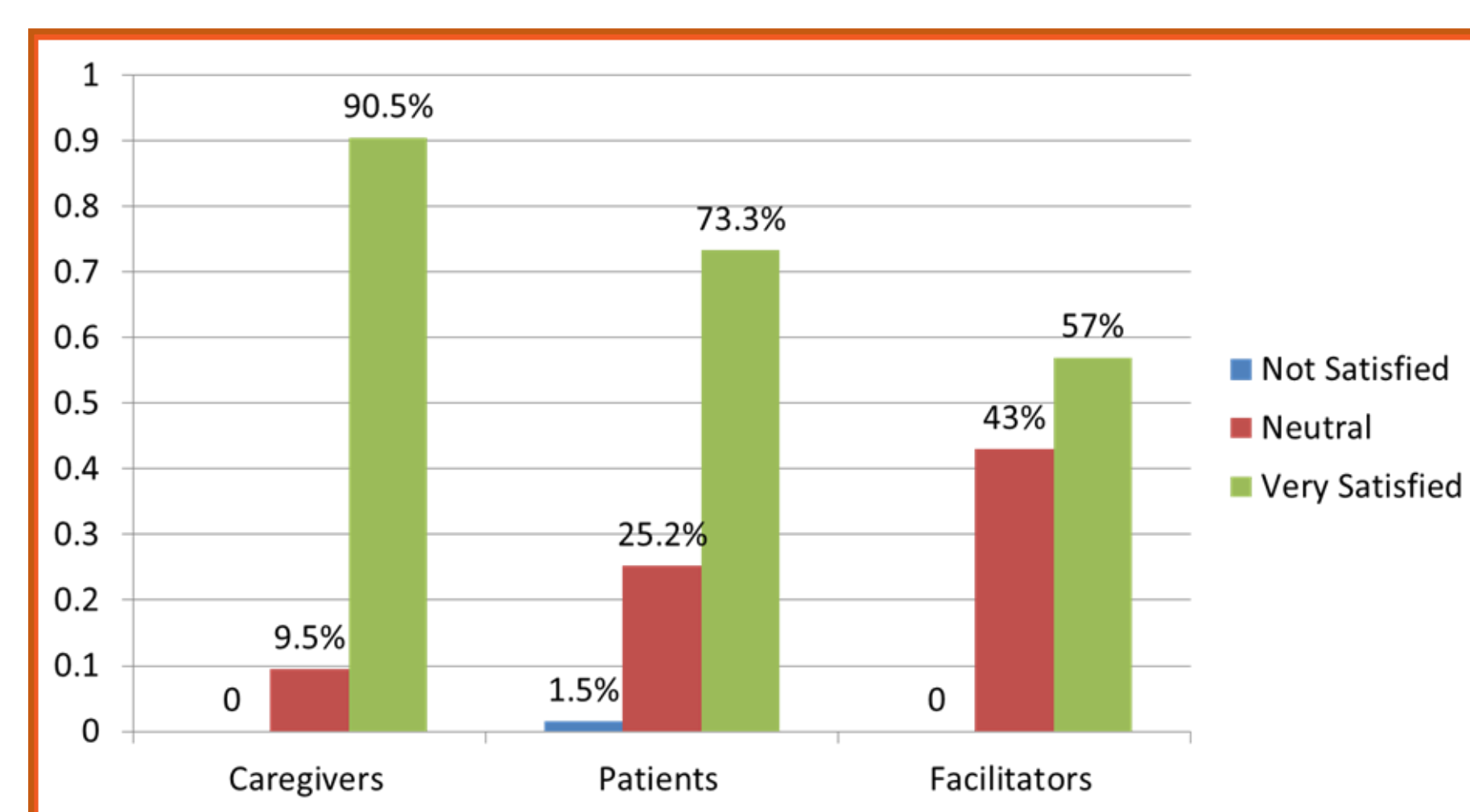


Figure 5. Caregivers' satisfaction

Almost everyone who took part in the therapy gave a good rating for satisfaction with 90.5% of nurses / caregivers, 73% of patients and 57% of the facilitators who responded positively (Figure 5).



Discussion

In the hospital setting, the persons with dementia (PWD) are more likely to be admitted compared to their peers without dementia. Once the older PWD are admitted, they are more likely to stay longer and develop hospital associated complications. The older PWDs are also more at risk of being restrained due to their cognitive deficits, language problem and inability to consistently follow instructions. (8,9) Most of the care teams have little formal training on dementia and caring for the older PWDs is often a challenge especially when resources and schedules are tight.

The social robot was able to stimulate the patients, both young and elderly, with or without cognitive issues in the wards physically, cognitively and socially. The patients showed active participation in the physical domain while instructed to do simple exercises as led by Pepper. The level of engagement was beyond the team's expectation, perhaps utilisation of artificial intelligence (AI) in an otherwise dull environment like a hospital ward was indeed new and refreshing. Interactions with AI is still a novel idea in our culture, especially in the healthcare setting where the AI is used as a means to entertain patients.

Pepper provided rare opportunities for a group of patients to gather and interact socially amid a busy hospital ward environment. The social interactions were invaluable, as these occasions would not otherwise have occurred because the care team are always busy. Pepper was able to stimulate the patients' long term memory during the sessions using reminiscence therapy. These were opportunities for cognitive stimulation which have been shown to improve cognition and quality of life for PWDs. (10)

Conclusion

In the current hospital setting where turnover is fast and everyone works under pressure, the elderly patients are mostly left immobile in their beds or chairs. The elderly PWD are often challenging for the care team to manage, due to the heavy physical needs, communication barrier and their complex psychosocial needs. Furthermore, the diagnosis of dementia is often not formally documented until the patients exhibit challenging behavioural symptoms or developed a hospital associated complication like falls or delirium. Hence, the elderly patients are at risk of developing functional decline due to immobility or restraint use. The future landscape of healthcare will likely utilise technology and artificial intelligence to meet the complex care needs of our patients and their caregivers.

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