

Effectiveness of Sitting in Older Adults with Altered Consciousness Admitted to a General Ward: A Case Series

Gerardo Candoni[®], Daniela Lecuona[®] y Carolina Troia[®]

Servicio de Kinesiología, Clínica La Sagrada Familia. Buenos Aires, Argentina

ABSTRACT

Introduction: Uprighting subjects with altered consciousness, either using a tilt table or seated positioning, enhances their behavior, arousal, and consciousness levels. The objective was to describe the physiotherapeutic management of a verticalization program in subjects with altered consciousness in the acute and subacute stages.

Materials and Methods: Subjects included were those diagnosed with altered consciousness and fluency in Spanish. Those missing 20% of the data were excluded. A seated positioning program was carried out for 30 minutes over 10 days, and changes in consciousness levels were measured using the revised coma scale and the presence of adverse effects.

Results: Of the eight subjects included in the study, seven showed improvements in their level of consciousness, and only one subject experienced adverse effects during the seated positioning program. One subject was excluded from the study due to incomplete data.

Conclusion: This study provides a comprehensive description of the physiotherapeutic management of a verticalization program for subjects with altered consciousness during the acute and subacute stages. The majority of the subjects included demonstrated an improvement in their level of consciousness.

Keywords: Alteration of consciousness, Revised Coma Recovery Scale, Neurorehabilitation, Sitting position, Rehabilitation, Case series.

Efectividad de la sedestación en adultos mayores con alteración de la conciencia internados en una sala general. Serie de casos

RESUMEN

Introducción: la verticalización de los sujetos con alteración de la conciencia a través de una mesa bipedestadora o a través de la sedestación genera mejoras en su conducta, su despertar y su nivel de conciencia. El objetivo fue describir el manejo fisioterapéutico de un programa de verticalización en sujetos con alteración de la conciencia en etapa aguda y subaguda.

Materiales y método: se incluyeron aquellos que tuvieran un diagnóstico en la alteración de la conciencia y fluentes en español. Se eliminaron aquellos de los que faltara un 20% de los datos. Se realizó un programa de sedestación por 30 minutos durante 10 días y se midieron el cambio del nivel de conciencia con la escala de coma revisada y la presencia de efectos adversos.

Resultados: de los ocho sujetos incluidos en el estudio, siete mostraron mejoras en su nivel de conciencia, y solo un sujeto experimentó efectos adversos durante el programa sentado. Un sujeto fue eliminado del estudio debido a datos incompletos.

Author for correspondence: gerardocandoni@gmail.com, Candoni G.

Received: 01/23/24 Accepted: 10/18/24 Online: 10/31/24

DOI: <http://doi.org/10.51987/revhospitalbaire.v44i4.337>

How to cite: Candoni G, Lecuona D, Troia C. Effectiveness of Sitting in Older Adults with Altered Consciousness Admitted to a General Ward: A Case Series- Rev. Hosp. Ital. B.Aires. 2024;44(4):e0000337

Conclusión: este estudio proporciona una descripción integral del manejo fisioterapéutico de un programa de verticalización para sujetos con alteración de la conciencia durante las etapas aguda y subaguda. La mayoría de los sujetos incluidos demostraron una mejora en su nivel de conciencia.

Palabras clave: alteración de la conciencia, escala de recuperación de coma revisada, neurorrehabilitación, posición de sedestación, rehabilitación, serie de casos.

INTRODUCTION

Altered consciousness is an organic mental disorder characterized by a deterioration in the ability to maintain awareness of oneself and one's surroundings and to respond to environmental stimuli.¹ It is estimated that the prevalence and incidence are 5/100,000 people and 5/100,000 people annually, respectively.² While many individuals quickly regain consciousness, some experience prolonged periods of altered awareness.³

Rehabilitation has proven to reduce mortality, disability, and the level of care required by family members.³ Stimulation could help awaken the patient and promote the training of previously unused areas of the brain.⁴

Dysfunction of the cerebral hemispheres or reticular formation of the brainstem can lead to this condition.¹ Alterations in the reticular activating system (RAS) can cause alterations in sleep, attention, learning, and memory.⁵ Furthermore, the RAS is involved in consciousness related to sensory perception and movement intention, both essential for formulating sensations and movements.⁵

Previous studies have shown that verticalization using a tilt table generates improvements in behavior,⁶ wakefulness⁷, and level of consciousness.⁸

In Australia, during the acute hospitalization period, physiotherapists reported that less than 70% use tilt tables as a therapeutic strategy, and among those who do not use them, one of the reasons cited was a lack of time in almost 18% of cases.⁹

The verticalization process can also occur through sitting. It has proven its effectiveness in improving the level of consciousness in subjects with altered consciousness.¹⁰

However, most studies that have shown some benefit from verticalization as a therapeutic strategy have not used the Coma Recovery Scale-Revised (), which is the tool that generates the least uncertainty, according to the *American Congress of Rehabilitation Medicine*.¹¹

To our knowledge, no studies have evaluated the effectiveness of sitting in adults with altered consciousness using the CRS-R and assessed its safety.

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Objectives

To describe a sitting program in adults with altered consciousness in the acute and subacute stages, the changes in the state of consciousness, and safety according to the CRS-R.

MATERIALS AND METHODS

Study Design

Case series.

Location and Participants

The study was conducted by collecting data from patients with altered consciousness in the inpatient ward of Clínica La Sagrada Familia, Buenos Aires (CABA). The review period was from February 1, 2022, to June 2022.

The included subjects were:

1. Those diagnosed with altered consciousness. The diagnosis was established using the CRS-R.¹¹
2. Spanish speakers.

Subjects with missing data for 20% of the variables were excluded from the analysis to avoid potential selection bias.

No exclusion criteria were applied.

Intervention

The evaluated subjects underwent a verticalization program using a sitting intervention protocol for ten days, 30 minutes per day on weekdays. Two physiotherapists were in charge; for subjects without head control, one physiotherapist controlled the orientation of the head and neck. We used cushions to improve positioning.

The criteria to begin the intervention were: systolic blood pressure between 100 and 220 mm Hg, oxygen saturation (SpO₂) > 90%, heart rate greater than 40 and less than 100 beats per minute, and body temperature lower than 38.5°C or higher than 35°C.

The safety parameters for stopping the sitting intervention were the presence of orthostatic hypotension, an increase of 30 beats per minute from the baseline heart rate, a heart rate equal to or less than 40 beats per minute, or the presence of tachypnea.

If there was no blood pressure monitoring, we used the last two criteria to decide whether to stop the intervention for that day.

We measured The level of consciousness on day 0 and day 11 of the intervention.

Data Collection

The subjects were identified through a search of electronic medical records.

The data were collected from a database by one researcher and validated by two other researchers. The data were presented individually, as this type of study design does not aim to evaluate the effectiveness of a treatment.

Collected Variables

Clinical-demographic variables: Age, sex, time of evolution, etiology, tracheostomy, feeding, craniectomy, medication, number of anticonvulsants, rebleeding, vasospasm, convulsive state, level of consciousness, and sessions were collected.

Primary outcome variable: The CRS-R, the Argentine version¹³ was used. CRS-R (subscores for auditory, visual, motor, oromotor, communication, and arousal).

Intervention and adverse events/complications: Completion, reason, orthostatic hypotension, frequency of hypotension, tachycardia, frequency of tachycardia, bradycardia, frequency of bradycardia, tachypnea, and frequency of tachypnea.

Ethical Considerations

The study was conducted following approval by the Ethics and Research Committee of the Universidad Abierta Interamericana (protocol number 1810). We guaranteed the participants' anonymity and protection of their data at all times.

RESULTS

We included eight subjects. One did not complete the final evaluation due to transfer to another institution. The clinical and demographic characteristics appear in Table 1. Subject 5 experienced orthostatic hypotension on two occasions during sitting. Regarding evolution, after completion of the intervention, six (85.7%) subjects showed an increase in the total CRS-R score. Subject 4 exhibited a change in the level of consciousness, transitioning from unresponsive wakefulness syndrome to a minimally conscious state. Subject 5 showed changes in subscale scores but did not achieve variations in the total score. The

results of the evaluations at the beginning and end of the interventions for each subject are presented in Table 2.

DISCUSSION

This study described the use of a physiotherapeutic verticalization program on subjects with impaired consciousness, resulting in changes in the state of consciousness in one subject and an improvement in the total CRS-R score in six out of eight subjects. All subjects (100%) exhibited changes in the subscale scores of the CRS-R. Subject 3 showed improvements in the total CRS-R score despite having the longest evolution time, suggesting that changes in the state of consciousness may occur regardless of evolution time.

Moriki et al. evaluated changes in the level of consciousness after sitting in subjects with various brain conditions, measured using the Glasgow Coma Scale (GCS), and reported a significant improvement in the sitting position compared to the supine position¹⁰. Toccolini et al. reported improvements in the GCS and alertness through eye contact following passive standing interventions using a tilt table⁸. Despite using a different scale, our results align with those studies.

Additionally, Krewer et al. evaluated the influence of early mobilization using a tilt table and a stepwise verticalization device in subjects with impaired consciousness¹⁵. In that study, both groups showed significant improvements in their state of consciousness during the three-week intervention period, as measured by the CRS-R, suggesting that verticalization appears to be beneficial and should be administered to subjects with this condition¹⁵. It is crucial to evaluate this treatment approach in a randomized controlled trial for early sensory stimulation with verticalization, as it could

Table 1. Clinical and Demographic Characteristics

	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6	Subject 7*	Subject 8
Sex	M	F	F	F	F	M	M	M
Age	70	78	71	63	83	72	65	73
Site of injury	Supratentorial	Both	Both	Supratentorial	Supratentorial	Supratentorial	Supratentorial	Both
Evolution time (days)	69	29	91	40	35	63	73	16
TQT	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Feeding	PEG	NGT	NGT	NGT	NGT	NGT	NGT	NGT
Craniectomy	Yes	No	No	No	No	Yes	Yes	No
Number of anticonvulsants	2	1	3	3	0	3	0	2
Complications								
Vasospasm	No	No	Yes	No	No	No	No	No
Rebleeding	Yes	No	No	No	No	Yes	No	No
Status epilepticus	No	No	Yes	Yes	No	Yes	No	No

TQT: Tracheostomy; PEG: Percutaneous Endoscopic Gastrostomy; NGT: Nasogastric tube; M: Male; F: Female

Table 2. Consciousness assessment

	Subject 1		Subject 2		Subject 3		Subject 4		Subject 5		Subject 6		Subject 7		Subject 8		
	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	
CRS-R	3	4	8	10	9	15	6	10	13	13	6	8	14		9	12	
Subscore																	
Auditory	1	0	1	1	1	4	1	2	3	1	0	0	1	-	1	1	
Visual	0	1	3	1	3	4	1	3	1	3	1	1	4	-	3	3	
Motor	0	2	2	5	2	4	0	2	5	5	4	4	4	-	2	2	
Oromotor	1	0	0	2	1	1	1	1	0	2	0	1	1	-	1	2	
Communication	0	0	0	0	0	0	0	1	1	1	0	1	1	-	0	1	
Arousal	1	1	2	1	2	2	3	1	3	1	1	1	3	-	2	3	
Level of consciousness	UWS	UWS	MCS	MCS	MCS	MCS	UWS	MCS	MCS	MCS	MCS	MCS	MCS	MCS		MCS	MCS

*Subject 7: no data available for the end of evaluation due to transfer to another institution. CRS-R: Coma Recovery Scale-Revised; UWS: Unresponsive Wakefulness Syndrome; MCS: Minimally Conscious State

provide the reported benefits in the state of consciousness while increasing accessibility to the therapeutic strategy.

During the intervention, only one subject experienced orthostatic hypotension on two occasions, which was detected and allowed complete recovery of his baseline state. Similarly, Riberholt et al. reported that some subjects with severe acquired brain injury exhibit orthostatic intolerance when mobilized on a tilt table. However, they observed a significant difference in the time to eye-opening after the intervention, underscoring the clinical relevance of implementing verticalization safely and with monitoring⁷.

The strengths of this study include the follow-up of subjects, the implementation of the CRS-R, and the feasibility of the intervention in resource-limited countries. The limitations are the selection of the intervention duration and timing, chosen according to the available medical records. Looking ahead, we highlight the need to study the persistence of the observed changes over time, whether the effect size achieved varies according to the time of evolution, and the potential impact of adding multisensory stimulation.

CONCLUSIONS

A sitting program for adults with impaired consciousness in the acute and subacute stages was described, along with changes in the state of consciousness according to the CRS-R. The verticality stimuli achieved through sitting represent a feasible and safe intervention.

Acknowledgments: The authors of this study would like to thank Camila Gentile, Guadalupe Aguirre, Olivia Gitard, and Lisandra Rougier for their collaboration.

Author Contributions: Conceptualization, Methodology: GC, DL, CT, Validation, Writing: GC, Visualization, Review: DL, CT

Conflicts of interests: the authors declare no conflicts of interests.

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