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Active music therapy in the rehabilitation of severe brain injured patients during coma recovery

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Summary. - Active improvised music therapy may offer an adjuvant form of treatment in the early rehabilitation of severe brain-injured patients. Active music therapy consists of musical improvisation between patient and therapist by singing or by playing different musical instruments, according to the vital functions, the neurological conditions and the motor abilities of the patients. We studied 34 severe brain-injured patients with a mean coma duration of 52 days ± 37.21 and a mean interval from coma onset to the beginning of rehabilitation of 154 days on average. Our preliminary results show a significant improvement of the collaboration of the severe brain-injured patients and a reduction of undesired behaviours such as inertia (reduced psychomotor initiative) or psychomotor agitation.

Key words: severe brain injury, coma, rehabilitation, active music therapy, complementary alternative medicine.

Riassunto *(La musicoterapia attiva nella riabilitazione dei gravi cerebrolesi).* - La musicoterapia attiva improvvisata può offrire una forma aggiuntiva di trattamento nella riabilitazione dei pazienti con gravi cerebrolesioni. La musicoterapia attiva consiste in improvvisazione musicale tra paziente e terapista attraverso il canto o l'uso di diversi strumenti musicali, compatibilmente con le funzioni vitali, con le condizioni neurologiche e con le abilità motorie dei pazienti. Abbiamo studiato 34 cerebrolesi gravi con una durata media del coma di 52 giorni ± 37,21 e un intervallo medio dal coma all'inizio della riabilitazione di 154 giorni. I nostri risultati preliminari mostrano un miglioramento significativo della collaborazione dei pazienti con gravi cerebrolesioni e una riduzione di comportamenti indesiderati come l'inerzia (ridotta iniziativa psicomotoria) o l'agitazione psicomotoria.

Parole chiave: grave danno cerebrale, coma, riabilitazione, musicoterapia attiva, medicina complementare alternativa.

Introduction

A delay of rehabilitation after brain injury could have a negative influence on the final outcome of the patients. Active, improvised music therapy based on the approach of Nordoff and Robbins [1] appears to offer a valuable form of adjuvant therapy in the early rehabilitation. The same approach was also utilized by Gustorff [2] with comatose patients. Active, improvised music therapy is musical improvisation between patient and therapist by singing or by means of different instruments (keyboard, percussion, wind), according to the vital functions (pulse rate, breath), the neurological conditions (degree of consciousness, behavioral disorders) and the motor abilities of the patient.

The Italian rehabilitation hospital Fondazione Santa Lucia, IRCCS, Rome, Italy, in cooperation with the German University of Witten-Herdecke started a preliminary study to verify the specific effect of active, improvised music therapy on the communicative abilities and interaction with the environment of patients during recovery from prolonged coma. The study concerned patients who suffered from prolonged coma and who have not yet recovered their verbal communication.

In particular in the last years we investigated the efficacy of improvised music therapy on psychomotor agitation after severe brain injury, associated or not with inertia.

Psychomotor agitation has been described as a favorable sign of recovery in the brain-injured patients [3], but may also compromise the collaboration during the rehabilitation program.

In the first phases of coma recovery the improvised music therapy is based primarily on the musical relationship, where the patient is encouraged to play, while accompanied by a therapist, a variety of instruments (percussion, keyboards and wind instruments), and also to sing and vocalize. Playing together, the music therapist improvises music with the patient and encouraged him or her to create a musical dialogue, stimulating the initiative and the active participation of the patient and sometimes interrupting undesired behaviors.

The aim of the study was to evaluate the effect of active, improvised music therapy on the communicative and interaction abilities of the patients and on the behavioral disorders of the patients during coma recovery.

Method

Single-case-design. We examined 34 patients with prolonged coma (more than 15 days), with Glasgow Coma Scale [4] ≦ 8 in the acute stage and Glasgow Outcome Scale [5] (GOS) ≦ 3 (severe disability at the admission time in the study). Lack of verbal initiative was the only criterion for the inclusion. Patients were examined by means of GOS, Disability Rating Scale - DRS [6], Coma Recovery Scale (CRS) [7] and Post-Coma-Scale (PCS) [8]; CRS and PCS both examine the interactive abilities of the patients with the environment, including the presence of undesired behaviors such as inertia and/or psychomotor agitation. The treatment protocol consists of six different evaluation times: on T0 at admission time; on T1 before starting music therapy (baseline) at 15 days after the starting of the routine rehabilitation program (physical therapy, cognitive therapy for all patients; respiratory and orthoptic therapy when needed); on T2 after 15 days from the starting of music therapy (as additional treatment to the routine rehabilitation program); on T3 at one month from the starting of music therapy; on T4 after two months, only if the music therapist and the examiner record improvements in the patient's neurological situation and on T5 one month after the suspension of the music therapy (follow up).

The treatment of music therapy was based on the approach of Nordoff and Robbins [1] and was performed on 3 times a week for 20-40 minutes (depending on the level of attention of the patient) and without changing any pharmacologic therapy during the period of music therapeutic treatment.

The evaluation was also performed by the music therapist, who examined the different video recordings of the music therapeutic sessions and by a blind examiner who judged randomised examples of video recordings for each patient by means of a semi-quantitative scale of the clinical modifications (+: improved; =: unchanged; 0: worsened). The clinical modifications examined were the followings: psychomotor initiative, psychomotor agitation, interaction with the environment.

The 34 patients included 17 males and 17 females, aged between 13 and 70 years, with a mean age of 35.94 years (range: 13-70). Eighteen of them suffered from traumatic brain injury, the others hypoxic, ischemic or hemorrhagic coma. The heterogeneity of etiology was not an exclusion criterion, because the patients shared the diagnosis of severe brain injury (GCS < 8), the duration of coma (prolonged coma) and the condition of minimally conscious state. The mean duration of coma (first obeying to simple commands) [9] was 52 days (range 15-150 ± 37,21) and the interval from coma onset to the admission at the rehabilitation hospital was of 154 days on average (range 22-503) (Table 1).

Results

Music therapeutic observations found out positive variations (video recordings) in 27 out of 34 patients, confirmed by a blind examiner in 21 out of the 34 patients, but not before than time T3 of evaluation. All the patients confirmed the changes at the follow up evaluation (T5). Whereas DRS and CRS failed to record the improvement of interactive abilities of the patients, PCS, which was also correlated with DRS and CRS in a previous study [8], demonstrated a higher sensibility in evaluating interesting changes of psychomotor initiative in minimally conscious patients, although without reaching the statistical significance. In particular behavioral disturbances, such as inertia and/or psychomotor agitation were significantly reduced during music therapy. In fact, during the music therapy sessions the patients with inertia and/or psychomotor agitation showed a significant improvement of the collaboration and a reduction of the undesired behaviors.

In particular, with regard to inertia, among the 27 patients who showed this behavior, in 17 patients (62.9%) an improvement was found at the video recordings of the music therapeutic sessions, whereas in 10 subjects there was not any significant change. In the majority of the agitated patients, 8 out of 9 (88.8%), psychomotor agitation was significantly reduced during music therapy, either according to the music therapeutic observations or to the evaluation of the blind examiner.

Moreover, in the 2 patients in which both behaviors (inertia and psychomotor agitation) were present, a significant improvement of both behaviors was recordered.

Discussion

Early rehabilitation of comatose and post-comatose patients may be compromised by the poor collaboration of subjects in minimally conscious state.

The standard rehabilitation approach, consisting especially of physical and cognitive therapy, is sometimes impossible or unsuccessful because of the presence of severe behavioural disturbances, such as inertia, psychomotor agitation or both. In these cases an approach with complementary alternative medicine may be useful. Active music therapy was already utilised with interesting results on the control of vital functions in comatose patients [2].

Table 1. - Clinical characteristics of the severe brain-injured subjects treated by music therapy

							Behavioural disturbances	
Id.	**Patient**	**Sex**	**Age**	**Aetiology**	**Coma duration**	**Interval from coma**	**Inertia**	**Agitation**
1	AM	m	26	TBI	60	184		+
2	AR	f	13	HC	30	104	+	
3	BC	f	29	TBI	27	92		+
4	BG	m	24	TBI	15	92	+	
5	BOG	m	91	TBI	60	202	+	
6	BS	f	42	TBI	40	169		+
7	BRG	f	48	SH	40	87	+	
8	CV	m	61	CH	30	199	+	
9	CG	f	50	CH	90	22	=	
10	CR	f	25	SH	150	228	+	
11	CA	f	55	SH	15	309	=	
12	COA	f	23	SH	60	199	+	
13	CG	m	22	TBI	75	182	+	
14	DF	m	24	TBI	20	270		+
15	BM	f	14	TBI	PVS	440	=	
16	MA	m	15	TBI	40	256		+
17	SS	m	70	CI	33	79	=	
18	GA	f	57	SH	90	92	=	
19	LM	f	35	TBI	45	78	=	
20	FD	m	17	TBI	15	72		+
21	FA	f	33	CI	70	122		+
22	GC	f	65	CH	45	109	+	
23	LE	m	52	TBI	15	34	+	
24	LF	m	35	TBI	40	128	=	
25	MC	f	33	TBI	90	114	+	
26	MAA	m	17	HC	90	74	+	
27	MF	m	28	TBI	90	247	=	
28	MS	m	45	ENC	15	137	=	=
29	PS	f	27	CH	54	163	+	
30	SF	m	28	CI	15	47	+	
31	SA	m	19	TBI	150	89	+	
32	VC	f	52	SH	53	69	=	
33	VAC	m	15	TBI	24	43	+	
34	VS	f	20	TBI	30	503	+	+

CH: cerebral haemorrhage; CI: cerebral ischemia; ENC: encephalitis; HC: hypoxic coma; SH: subarachnoid haemorrhage; TBI: traumatic brain injury; +: improvement of the undesired behaviour (inertia or agitation); =: unchanged.

In this study, although the evaluation scales utilised were of poor support in monitoring the behavioural changes during music therapy, music therapeutic observations of the video-recorded sessions (also by the blind examiner) showed significant changes in the interactive abilities of the patients. In particular, an improvement of inertia and a reduction of psychomotor agitation were observed in the majority of the patients, possibly secondary to the direct and active involvement of the patient in the musical dialogue.

In our study, the impossibility of a control group depends on the heterogeneity of the clinical condition of comatose patients and of their recovery course, that does not lead the individualisation of a comparable control group. The lack of the control group is however compensated by the therapeutic protocol; in fact, in single-case-design each patient is control of himself, since the evaluation scales utilised were administered at the admission time and 15 days after the starting of the routine rehabilitation, in order to exclude spontaneous recovery. If these preliminary results might be confirmed in larger series of minimally conscious patients, also by means of the utilisation of more sensible evaluation scales, active music therapy may be proposed as an adjuvant treatment in the early rehabilitation of severe brain-injured patients. Since the preliminary nature of our results it is to stress the need of further investigation before making any assumption about the usefulness of this complementary treatment.

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