

# Occupational Therapy for Musicians with Upper Extremity Overuse Syndrome: Patient Perceptions Regarding Effectiveness of Treatment

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## Abstract

Twenty-six musicians who were seen by an occupational therapist at the Medical Center for Performing Artists at the Cleveland Clinic Foundation responded to a survey designed to collect demographic data and evaluate treatment effectiveness. The results of the survey indicate that the occupational therapy program was perceived by most of the musicians to be effective in decreasing the symptoms for which they sought treatment and in increasing work productivity. Not all of the musicians found the therapy to be helpful, and some of the musicians continue to have problems, even with the involvement of many medical services and other treatments provided by professionals outside of the medical model. Overuse problems were reported more frequently among the female musicians surveyed. The right hand was the most common site of injury. Pianists and string instrumentalists were more frequently seen in therapy than other types of musicians. A significant reduction in pain from time of initial onset to time of response to the survey was reported by the responding musicians. The survey helped to identify types of treatment provided in occupational therapy, which were valued by the musicians as effective in relieving symptoms which interfered with practice and performance productivity. More research is needed to improve effectiveness of the rehabilitation of this interesting group of patients.

The prevalence of overuse syndrome among musicians has been well-documented in the literature.<sup>1-3</sup> Overuse syndrome is defined as symptoms associated with activity that exceeds the biological limits of the tissues involved.<sup>2</sup> Many centers caring for performing artists rely upon occupational therapists for assistance in the rehabilitation of musicians who experience problems related to overuse of the upper extremity.<sup>1,2</sup> Occupational therapists can offer the following services to these musicians:

1. functional evaluation of the upper extremity;
2. splinting of the upper extremity (to provide rest and promote healing, to position the upper extremity more effectively for performance, to protect joints or soft tissue during activity, to increase function after surgery or after injury, and to substitute for lost or weakened function of the hand);
3. exercise and activity programs (rehabilitative and preventive) to increase strength, flexibility, endurance, dexterity, and coordination;
4. therapeutic use of ice and heat as adjuncts to exercise or performance programs;
5. adaptation of the instrument, playing position, or performance chair;
6. evaluation and adaptation of practice and performance schedule;
7. instruction in preventive activities such as warm-up and cool-down programs to prepare soft tissues for stress;
8. evaluation and adjustment of all activities of daily living which may contribute to the problem;
9. adaptive equipment for activities of daily living (to improve task efficiency and body mechanics for all activities that a musician undertakes throughout the day);
10. education in joint and soft tissue protection techniques;
11. evaluation of psychosocial components such as life stress, time management, performance anxiety, social and interpersonal skills, frustration tolerance, compulsive or obsessive behavior; and
12. relaxation training and other techniques to manage physical and psychological stress;

Occupational therapists at the Cleveland Clinic Foundation have been involved since 1984 with the evaluation and treatment of musicians with various types of overuse problems. The purpose of this paper is to discuss the effectiveness of the treatment provided in occupational therapy

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for musicians with upper extremity overuse syndrome who were seen from January 1984 through June 1987 at the Cleveland Clinic Foundation. The authors wanted to find out whether the musicians were benefitting from the program, and which specific treatments seemed to be effective. Also, some demographic data will be reviewed to gain further insight into the nature of the overuse syndromes.

## Methods

Forty-seven musicians who were seen by an occupational therapist through the Medical Center for Performing Artists at the Cleveland Clinic Foundation (between January 1984 and June 1987) were sent a retrospective survey by mail in August 1987. Ten of these patients had been surveyed in a previous study,<sup>2</sup> but all patients seen since January 1986 have not been reported.

A follow-up survey was sent to nonrespondents 1 month later. The survey was combined with a retrospective chart review of the responding musicians to obtain the following data: date of onset, location and nature of symptoms, demographic information (such as age, gender, primary work role, primary instrument played), time spent for practice and performance, medications presently being taken, pain scales before and after treatment, treatment techniques still being used, perceived effectiveness of the occupational therapy treatment provided, other medical or non-medical treatment received, and length of practice and performance time that was lost or gained from time of injury to present levels of functioning. To evaluate pain levels before and after treatment, a numerical pain rating scale was used as shown below. Pain scales were recorded by the musicians for periods of rest, while playing, after playing, and during activity.

### Pain levels

0—no pain

1—minimal pain, occasionally

2—minimal pain, constantly

3—moderate pain, occasionally

4—moderate pain, constantly

5—severe pain, occasionally

6—severe pain, constantly

Minimal: does not interfere with activity

Moderate: limits intensity or duration of activity

Severe: cannot perform activity at all

The age, sex, and chief complaint of the nonrespondents were also recorded to assess any gross differences in the two groups. The frequency of responses to each question was tabulated; the patient's recall of symptoms on the survey was checked by comparing it with the symptoms reported in the medical record. The pain-level responses were graphed to record the number of patients who reported pain at each level on the pain scale, the number of patients who reported a change in pain after treatment in occupational therapy, and the quantity of the changes reported. Also, a *t*-test was performed comparing the pain-rating scales before and after

treatment. The frequency of patients who are continuing to use various treatments suggested in the occupational therapy home program was computed as a measure of which treatments are valued as effective by the musicians.

## Results

Responses were received from 26 of the 47 musicians who were surveyed (55%). This was considered to be an adequate return rate, as many of the musicians were students with no forwarding address available. The age range was 17–45, with an arithmetic mean age of 27.8 years. Eighteen respondents were female (67%). The reported time spent performing with a musical instrument ranged from 6–30 years, with an arithmetic mean of 18.5 years. Fifteen of the respondents (58%) were students at a music conservatory. Seven respondents (27%) were professional performers, and the remaining four musicians (15%) were teachers. Fourteen of the musicians (54%) listed the piano as the primary instrument played. The remaining musicians listed the following primary instruments played: violin (3, 11%), cello (3, 11%), organ (2, 8%), clarinet (2, 8%), flute (1, 4%), and guitar (1, 4%). The respondents estimated that they spent between 0–35 hours per week performing, with an arithmetic mean of 10 hours. Ten of the patients were seen between January 1984 and December 1985. Seven patients were seen in 1986, and nine patients were seen from January through June, 1987. Table 1 reveals how long the musicians had experienced symptoms prior to seeking treatment, and what effect the symptoms had upon work productivity.

Table 2 shows the frequency and location of the symptoms, signs, and diagnoses reported by the musicians surveyed. Several musicians reported multiple symptoms and locations. Although asked to report symptoms, some patients responded with the diagnosis given by the physician who referred the patient to therapy.

Some of the musicians received treatment from other health care professionals within the Medical Center for

TABLE 1. Length and Effect of Symptoms

Length of Symptoms Prior to Seeking Treatment	No. of musicians	%
Less than 2 months	3	11
2–6 months	8	31
6–12 months	7	27
Greater than 12 months	8	31

Effect of Symptoms Upon Performance

	No. of musicians	%	Range of Hours/Days	Mean Hours/Days
No decrease in performance productivity	2	8		
Decrease in performance in hours per week	8	30.5	3 to 21	8
Stopped playing in number of days	16	61.5	3 to 365	68

**TABLE 2.** Frequency and Location of Symptoms, Signs, and Diagnoses

Description of Problem	No. of Patients	Location of Problem	No. of Patients
Pain	13	Right hand/fingers	12
Tendinitis	8	Right forearm	9
Weakness	4	Left hand	5
Soreness	4	Right wrist	4
Tingling	4	Left forearm	2
Overuse	3	Left wrist	2
Fatigue	2	Right elbow	1
Stiffness, tightness	2	Left elbow	1
Numbness	2	Right shoulder	1
Cramping	2	Left shoulder	1
Clumsiness, incoordination	1	Neck	1
Swelling	1		
Thoracic outlet syndrome	1		
Carpal tunnel syndrome	1		

Performing Artists. All 26 patients were seen by a neurologist, who referred the patients to occupational therapy. Ten patients were also seen by a physical therapist. Three patients were seen by a hand surgeon, and one of those patients underwent hand surgery. Three additional patients were seen by a rheumatologist.

Seven musicians reported that they had sought additional treatment from sources outside of the Medical Center for Performing Artists. The types of treatment and frequency of patients who participated in these treatments are: massage (2), advice from another musician/teacher (2), the Alexander Technique<sup>7</sup> (2), another occupational therapist (1), a chiropractor<sup>8</sup> (1), and acupuncture (1). Some patients reported that they sought help from more than one of the listed treatments. Only 2 of the musicians reported that they are presently taking any medication (indomethacin) for their reported symptoms.

Table 3 lists the number of sessions and the duration of time that the musicians were treated by occupational therapists for their symptoms. Only seven of the patients were seen for more than two sessions of therapy. Four of these seven reported positive responses to the questions regarding effectiveness of therapy. Six of 11 patients who were fol-

**TABLE 3.** Frequency and Duration of Occupational Therapy (OT) Intervention\*

No. of OT Treatment Sessions Attended	No.		Time Span of Therapy	No.	
	No.	%		No.	%
One	12	46	One session only	12	46
Two	7	27	3 weeks	2	8
Three	2	8	4 weeks	1	4
Four	4	15	5 to 8 weeks	5	19
Seven	1	4	9 to 12 weeks	3	11
			13 to 26 weeks	2	8
			Greater than 1 year	1	4

lowed for longer than 5 weeks reported that therapy was ineffective at decreasing symptoms or increasing work productivity. There is no clear correlation between number of treatments, treatment duration, and treatment effectiveness in this study.

The musicians were asked if occupational therapy was effective in reducing the severity of symptoms and in increasing work productivity (time able to practice and perform without return of symptoms). Seventeen (65%) musicians responded yes to both questions. Of the patients seen since January 1986, 15 of 16 (94%) responded yes to both questions.

In order to assess the musicians' ability to recall information, the initial symptoms taken from the medical records were compared to the symptoms reported on the survey. Surprisingly, 19 musicians matched symptoms exactly. No musician reported symptoms that were contradicted in the medical record (i.e., pain left arm vs. pain right arm). However, three musicians reported additional symptoms and/or locations that were not on the chart. Three patients failed to report symptoms that were recorded on the medical chart. Some information was obtained from the medical records of the 21 musicians who did not return surveys. The age range was 19-37, with a mean of 24.9 years. Eleven of the nonrespondents were male. The chief complaints (and/or diagnoses) and frequencies were as follows: pain (14), tightness (4), cramping (2), de Quervain's (1). The locations of the problems were as follows: right hand/fingers (7), right forearm (7), left forearm (3), right wrist (2), left wrist (1), and left hand (1).

The measurement of pain is difficult to perform objectively. The 1 to 6 pain-rating scale was chosen because it was similar to scales found in other readings,<sup>4-6</sup> and because it seemed to describe best the types of pain that had been reported by the musicians upon initial evaluation. The musicians' opinions regarding the change in pain that occurred since receiving treatment may be of interest. Table 4 shows the musicians' responses for pain levels both before and after treatment.

Table 5 lists the number of musicians who reported a change in pain-scale ratings before and after treatment, and quantifies the amount of change reported. As many as 9 of

**TABLE 4.** Pain Levels Reported in Number of Musicians\*

No. on Pain Scale	At Rest		While Playing		After Playing		During Activities	
	B <sup>†</sup>	A <sup>‡</sup>	B	A	B	A	B	A
6	0	0	2	1	4	1	2	0
5	5	1	4	0	3	1	6	2
4	5	2	8	3	8	3	3	1
3	3	3	7	3	5	8	7	6
2	3	5	2	7	2	4	3	5
1	6	9	0	6	0	5	2	7
0	2	4	2	4	2	2	1	3

\*Two of the musicians surveyed failed to report pain scales.

<sup>†</sup>B = before receiving occupational therapy.

<sup>‡</sup>A = after receiving occupational therapy.

**TABLE 5. Number of Musicians Who Reported a Change in the Pain Scale**

Points Changed	At Rest	While Playing	After Playing	During Activity
-6	0	0	1	0
-5	1	1	0	0
-4	1	4	1	4
-3	2	2	5	2
-2	4	5	3	3
-1	6	4	6	5
no change	8	7	6	9
+1	0	0	1	0
+2	0	1	1	1
+3	0	0	0	0
+4	1	0	0	0
+5	0	0	0	0
+6	0	0	0	0

26 musicians reported no change in pain since participating in the therapy program. Two patients experienced more pain since participating in therapy. The largest portion of patients (as many as 14) experienced a decrease in pain between 1 and 3 levels since therapy. Five patients reported that pain decreased 4 to 6 levels since participating in therapy.

A *t*-test was performed to determine pain levels before and after therapy for each of the categories that were used on the survey. Table 6 indicates that there was a statistically significant decrease in pain among the respondents to the survey ( $p < .01$ ) in all areas (at rest, while playing instrument, after playing instrument, and during daily activities). The largest decrease in mean pain levels after therapy occurred in the "while playing" category (3.58 to 1.47). The highest mean was in the "after playing" before therapy category (3.615).

The musicians were asked to report how many hours per week they could presently practice and perform without experiencing a return of their symptoms. The data revealed that three of the musicians were not presently practicing or performing. One musician was playing up to 35 hours

**TABLE 6. *t*-Test Results for Pain Level Differences Before and After Occupational Therapy**

	MEAN	SD	P
At rest:			
Before therapy	2.538	1.816	
After therapy	1.576	1.390	.004
While playing instrument:			
Before therapy	3.580	1.470	
After therapy	2.076	1.520	.0001
After playing instrument:			
Before therapy	3.615	1.576	
After therapy	2.307	1.594	.004
During activities of daily living:			
Before therapy	3.115	1.796	
After therapy	1.923	1.494	.0005

per week. The mean of the 20 responses recorded was 10 hours per week. Six respondents did not answer this question on the survey. Five of these six respondents also reported that they felt that the occupational therapy was not effective at increasing work productivity.

Table 7 lists the occupational therapy treatment techniques that the musicians were continuing to use to relieve or prevent return of their symptoms.

## Discussion

The survey provides some interesting demographic data to answer questions about overuse injuries among musicians. The conclusions about the effectiveness of the occupational therapy must be tentative, owing to the small sample size, the research methods used, and nature of the information collected. Some interesting conclusions can be stated regarding the population of musicians that was surveyed:

1. The right hand and forearm seem to be the most common location of injury reported by the musicians. This has been reported elsewhere in larger studies.<sup>1,2</sup> This problem may occur most commonly among pianists (who made up 54% of the respondents).

2. Pain and inflammation are the most common problems reported by the musicians, but there is a wide variety of medical problems that can affect performance.

3. Over half of the musicians who returned surveys had experienced symptoms more than 6 months prior to seeking medical attention for those symptoms. One might hypothesize that there is a tendency to deny symptoms, or at least a hesitancy on the part of the musicians to deal with the medical community to relieve the symptoms.

4. A large number of students were in the population that was studied. Are students more likely to seek help, or are they more likely to develop problems due to lack of experience or poor technique? One hypothesis reported in the literature is that professional musicians are less likely to seek medical attention for fear of loss of their jobs.<sup>9</sup> However, it should also be noted that the Cleveland area has a large number of music conservatories, which facilitates the referral of many students to our center.

5. Eighteen of the respondents were female. Do these problems occur more frequently in females? The literature reviewed seems to confirm this hypothesis.<sup>1,2</sup>

6. The piano, other keyboard instruments, and string instruments are the most frequent sources of problems in this study as well as in other studies.<sup>1,2,3,9</sup> However, these are also the most common instruments to be studied by musicians.

7. These injuries seemed to have a variable effect upon work productivity of the respondents. Ten of the respondents did not lose any days of work. One respondent could not play for a whole year.

8. One might conclude that these patients seem to be relying on methods other than medication to deal with their symptoms. Only seven of the musicians sought further help after receiving treatment in occupational therapy. Six of

**TABLE 7. Number of Patients Who Reported That They Are Continuing to Use Techniques Learned in Therapy**

<i>Technique</i>	<i>No.*</i>	<i>#Px<sup>†</sup></i>	<i>Technique</i>	<i>No.</i>	<i>#Px</i>
Icing the painful area after stress	12	15	Dexterity exercises	11	11
Heat in the form of warm soaking or hot pack	9	9	Strengthening exercise	14	22
Warm-up or cool-down exercise prior to playing	21	22	Relaxation techniques	7	7
Rest or temporary discontinuation of playing	10	10	Adaptation of playing position or technique	11	11
Full-time splinting to provide complete rest	2	8	Adaptation of musical instrument	4	4
Part-time splinting during periods of increased pain	7	12	Joint protection techniques	2	2
Playing splint	2	4	Work simplification techniques	3	3

\*No. = number of musicians who report that they still use technique.

<sup>†</sup>#Px = number of times technique was prescribed by a therapist.

those seven patients also were referred to other services at the Cleveland Clinic Foundation. Ten of the 26 patients were seen only by a neurologist experienced in problems of performing artists (Dr. Richard Lederman) and an occupational therapist. Nine of those ten musicians responded yes to the two questions regarding the effectiveness of occupational therapy. We can only conclude that some musicians did well with minimal intervention; some of these problems are not easily solved, even with team involvement and several opinions.

9. Upon gross examination of the nonresponding portion of the population, there were no significant differences identified except for the fact that 11 of the 21 nonrespondents were male. The nature of complaints and the ages of the nonrespondents seemed homogeneous with the responding group. Unfortunately, other information about the nonrespondents (i.e., instrument played, duration of symptoms) was not obtained when the charts were reviewed.

What conclusions can be made about the musicians' perceptions of the effectiveness of occupational therapy?

1. Sixty-five percent of the musicians reported that the therapy was effective at decreasing symptoms and increasing work productivity. Ninety-four percent of patients seen since 1986 reported that the therapy was effective. No strong conclusions can be made as to the reason for these findings, but one could at least conclude that general response to the program was positive. Those receiving treatment after 1985 should be surveyed again to see if the techniques continue to be effective.

2. The pain scales indicate that a clear majority of the patients (as many as 16 of 24) reported that pain decreased since the onset of treatment. The cause of this decrease is purely speculative. It is helpful, however, to note that only two patients felt that there was an increase in pain from time of initial treatment. Also, the decrease in pain was statistically significant in all four areas studied (at rest, while playing, after playing, and during activities). The strongest statement that can be made is that with time as many as 62% of the respondents reported a decrease in pain since participating in occupational therapy. The significant variability in the initial pain levels (depending upon the type of injury and level of inflammation at initial evaluation), the lack of a control group, and the subjective nature of

the pain scale all become too problematic to making any strong conclusions about these data.

3. Initially the researchers hoped to reach some conclusions about changes in work productivity after initiation of therapy. However, errors in the survey questions created unusable data for this section. We do know that three of the musicians are presently not performing at all, and that the most productive respondent performs/practices 35 hours per week. We also know that 17 of the respondents have been able to increase playing/performance time since initially being seen in therapy. Many musicians reported that onset of these problems occurred with a drastic increase in practice and performance time. The productivity numbers reported by the musicians indicate that many of them now maintain a practice/performance schedule of 4 to 5 hours per day. Careful management of one's performance schedule may be the most effective way to manage or prevent these problems.

4. The musicians seem to be faithfully following treatment suggestions given in occupational therapy, as seen by the results in Table 7. The most frequently issued treatment was a gentle, prolonged, active stretching exercise program. Twenty-one of 22 musicians are continuing to follow this program prior to playing their instruments (and in many cases after playing as a cool-down procedure). Exercises to strengthen specific muscles (14), icing of the painful or swollen areas after playing (12), adaptation of playing position or technique (11), and exercises to increase dexterity (11) were also more frequently recommended by therapists and carried out by the musicians. The data on full-time, part-time, and playing splints should be regarded cautiously, as most full-time splinting is only a very temporary measure in cases of severe pain and inflammation. The therapists' personal experience with playing splints has been that it is quite difficult to design a splint that protects an over-stressed joint or soft tissue without compromising technique, or decreasing the dexterity needed by the musician to perform. Other treatments should be attempted before approaching the problem with playing splints. A wide variety of treatment suggestions have been used in the management of problems encountered by musicians seen in occupational therapy. The musicians seem to value the suggestions, as indicated by a very high percentage of musicians who are continuing to use the techniques learned even 3 years after

being seen in therapy. There is certainly room for improvement in the program, as not all musicians perceived occupational therapy as effective. A few musicians even felt that some of the treatment suggestions were harmful. One example of this is quoted from the comments section of the survey: "I think that the exercises given me were too difficult and caused the tendinitis to get worse".

The rehabilitation of musicians with overuse syndromes is complicated and requires further investigation. More musicians need to be surveyed. The treatment techniques being used need to be more effectively monitored and studied. More careful documentation of pain levels and work productivity would have enhanced this study and should be done in the future. A holistic approach that can be provided by a medical center for performing artists is an asset in the treatment and study of these problems. The individual growth and development of expertise experienced by these authors could not have occurred without such a setting. Performing artists deserve these comprehensive services!

We hope this study points out the fact that seeking feedback from the musicians has helped in program development. It has identified some treatment techniques that were helpful and some that were not helpful to these musicians. The effectiveness of the therapy (as measured by musicians' perceptions) does seem to be improving. The need for continued evaluation of this program and other medical interventions for musicians is apparent. Occupational therapists and other medical professionals have shown much devel-

opment in the understanding of overuse syndromes but still face many unanswered questions regarding the rehabilitation of this challenging and interesting population of patients.

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