

Cognitive behavior modification through music project

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Twenty-week study of the cognitive, behavioral, and physical effects of music on patients with moderate to late dementia, in particular Alzheimer's disease, during the time of day associated with sundowning in a nursing care facility

16 pages, 8 figures, 2 tables, 1 appendix

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Abstract

For twenty weeks, music performances (duration 30-60 minutes) were held two to three times a week at the Northampton Rehabilitation & Nursing Center. From the Rockwell Unit, seven patients (mean age 80 years) with moderate to severe dementia, likely Alzheimer's disease, were selected to participate as a focus of the study. Behavioral observations and measurements of blood pressure and pulse were taken during each session, which were held during the time of day associated with sundowning (3-5 PM). The usage of medications in these patients was also monitored for changes. No significant differences were found in blood pressure, pulse, or medications, but the behavioral effects were vast. More importantly, the quality of life of the patients was improved, and the morale of the nursing staff and the community members who volunteered their time increased dramatically. (Beverly Pickering, Cognitive Behavior Modification Through Music Program Facilitator; Pamela Hamburg, Alzheimer's Program Director, Rockwell Unit, Northampton Rehabilitation & Nursing Center; Jason Trotta, Executive Director, Northampton Community Music Center; Jillian Anderson, Program Intern, Smith College, Neuroscience Department).

Introduction

Geriatric care facilities, such as nursing homes, are becoming overpopulated and many are understaffed. Families unable to provide proper care for elderly members who have become confused and more difficult to manage with age generally turn to care facilities for assistance. Dementia is a common source of disability among the elderly that is causing an increase in healthcare spending and a decreased quality of life for the patient and family (Aldridge, 1993). Unfortunately, many patients in care facilities still do not receive ample care or attention, often due to the low income of the care providers.

Most institutionalized individuals suffering from Alzheimer's disease and other forms of dementia exhibit behavioral problems, another contributor to poor care (Volicer et al, 2001). Behavioral problems can occur at any time and range from insomnia and restlessness to yelling and striking care providers. Sundowning, or sundown syndrome, is described as the array of symptoms experienced by patients with dementia particularly in the late afternoon and often through the evening. Frequently this time of day exacerbates symptoms of Alzheimer's (Volicer et al., 2001). Patients are typically confused, anxious and demanding. They spend their time wandering, sleeping, shouting, and exhibiting other negative behaviors. Possible reasons for this behavior are fatigue at the end of the day, lower light due to sunset, fewer and different staff on the evening shifts in care facilities, and the end of visiting hours in nursing homes (Campbell, Williams, & Mlynarczyk, 1986). According to Bliwise et al. (1985), sundowning is a typical cause for institutionalization of demented patients and remains a problem in their management.

There are certain activities and ways of caring for patients that help alleviate the aggressive behaviors experienced during this time of day. It is believed that music may ameliorate some of the impact of the disease. Although it is not a cure, patients with Alzheimer's exhibit great response to music (Aldridge, 1993). Gwyther (1985) suggests that, among other things, familiar tunes can be a source of comfort to some, and the organization of music programs in the late afternoon is especially effective in relieving some sundowning symptoms. This is defended by the fact that Alzheimer's patients continue to sing old songs and dance to past tunes despite aphasia (loss of language) and memory loss. While language deterioration is a feature of cognitive deficit, musical abilities appear to be preserved (Aldridge, 1993). When people listen to and perform music they utilize both primitive areas of the brain and higher cognitive systems (Aldridge, 1993; Levitin, 2006). Aldridge (1993) argues that the quality of life

of Alzheimer's patients is dramatically improved by music therapy, in conjunction with the overall social benefits of acceptance and sense of belonging gained by simply communicating with others.

Materials and Methods

Subjects

Seven patients were chosen from the Rockwell Unit at the Northampton Rehabilitation & Nursing Center, aged 60 years and older (five female, two male; mean age 80 years). All patients were assessed by the Mini-Mental State Examination (MMSE) and the Global Deterioration Scale (GDS), both of which are cognitive tests. They were determined to have moderate to severe dementia, most of which is suspected to be a result of Alzheimer's disease. To preserve confidentiality, the patients were labeled with letters (A-G).

Music

Students and professionals affiliated with the Northampton Community Music Center volunteered their time to perform for the project. Performances were varied and incorporated vocals, piano, double bass, brass instruments, steel drum, string instruments, guitar, and flutes. The assorted styles of music included jazz, classical, ragtime, and Broadway. For consistency, every session started with the "Star Spangled Banner," (Francis Scott Key, 1814) and ended with "Till We Meet Again" (Raymond B. Egan / Richard Whiting, 1918).

Procedure

Performances (a total of 48) were held two to three days a week for twenty weeks. Each session was held between three and five PM and lasted approximately 30 to 60 minutes. The seven patients were brought to a designated vicinity of the nursing home (a dining room) and seated in a semi-circle formation in front of the performance area. The nurses on duty were asked

to prepare the patients as if they were going to a concert: toileted, hair combed, clean clothes, tied shoes, etc. Other members of the nursing and rehabilitation center were invited to attend the performances. Before and after the scheduled performance, there would be piano playing generally accompanied by vocals while patients were brought in and out of the room.

To begin each session, all parties present were introduced: the patients, performer(s), and observer(s). The opening piece would be announced and played, and everyone was asked to sing along. Following, the performer(s) would begin, saying the title and origin of each piece before performing. Performers were encouraged to interact with the patients, for example, by explaining to them differences in timbres of instruments, or how an instrument is played.

Depending on the type of music being played, patients were frequently invited to sing or to participate by clapping, snapping, tapping, or using musical instruments (like shakers). Observations were taken based on the reactions of the patients to the performances (see Appendix 1), with check marks and comments used to indicate that a patient was exhibiting a certain action. The overall mood of each of the patients was estimated at the beginning and end of each session. An employed nurse at the nursing home measured the blood pressure and pulse of every patient twice during the performances (approximately at the beginning and at the end using an Omron HEM-629 Wrist Blood Pressure Monitor).

Results

Ideally, there would be a significant difference found over time in blood pressure, pulse, behavior, and/or use of medications. However, it was difficult to analyze the data collected, and it is hard to say whether or not there were any considerable differences. Figures 1-4 display the average blood pressures of each patient at the beginnings and ends of sessions over five-week

periods. Figures 5-8 show the average pulses of each patient at the beginnings and ends of sessions over five- week periods.

Table 1 shows the documented administration of *pro re nata* (PRN) medications, those that are administered on an as-needed basis. The PRNs included in the investigation are limited to those that are given for behavioral problems like agitation, elopement attempts, etc. However, the data were too sparse to analyze. Table 2 summarizes the overall behavioral changes that were observed in the patients over the course of the twenty-week study.

Discussion

There is little difference between the beginning and end measurements of blood pressure and pulse of each patient. There is also no consistent rise or fall of values, between patients or five-week periods. For instance, Patient B's blood pressure rose slightly in Figure 1, but in Figure 3, it falls slightly. Additionally, in each figure, while some patient's measurements (either blood pressure or pulse) increase from beginning to end, others decrease.

There are many sources of error and disparity in this study. The blood pressure cuff used was electronic and measurements were taken quickly, leading to possible inaccuracies. During measurements, patients would often be moving and sometimes the wrist cuff would be placed on opposite arms. It was also difficult to take the measurements directly at the beginning and end of the sessions so there was a change in timing from session to session.

Table 2 is an over-generalization of the effects that the music study had on the patients' behaviors. It was compiled from all of the documented notes taken by one observer who attended most of the sessions. It was challenging to summarize all of the information, stemming from challenges faced collecting the information. A problem encountered with observing the patients was that it is unfeasible to place a numerical value on behaviors and actions that were observed.

For instance, when measuring foot tapping, it might be possible to count the number of foot taps, or time the duration of tapping. With seven patients, however, and other aspects of behavior that were being observed, this was not an option. Thus, without a numerical scale for observation, it was difficult to summarize behavioral changes in patients throughout the study.

Another obstacle that was experienced was the method of record keeping used by the nurses. It was not easy to gain commitment of nursing staff on duty, during the sessions and otherwise. The arrival of the patients was frequently staggered and untimely, and patients would sometimes leave early to use the bathroom, due to not being toileted ahead of time. From nurses on duty after the session or on days when no session was held, more detailed notes on medications, sleeping, eating, and sociability of the patients would have been very useful. These notes could have been used to supplement behavioral changes.

Overall, it was challenging to ask the staff to complete these tasks because there was a lack of understanding about the project and they viewed the extra work as unnecessary. There seemed to be a lack of incentive for them considering they are paid low wages to do their job. Having an entire staff dedicated to such a project would have been invaluable.

Table 1 shows that the PRN usage changed very little over the course of the study, possibly because the notes taken on the medications that were administered were lacking substance. It would be helpful for the nursing staff to understand that all aspects of patients' lives, as opposed to merely the time they spent at the sessions, were important to the study. Additionally, only behavioral PRNs were examined, with the thought that if the music programs helped to improve any behavioral problems, the medication usage would decrease. It would have been beneficial to look at other PRNs (those issued for constipation, insomnia, etc.) since the

administration of PRNs for behavioral problems are used as a last resort, and it is possible that the music sessions would have an effect on these other aspects of life.

For future research, a point-by-point observation system could be set up to ensure that each patient receives an equal amount of observation, but also to focus the attention of the observer on one person at a time. It would be helpful to regulate the length of each session, creating a less variable time frame. This would aide in the point-by-point observation so that each patient would receive the same amount of observation time. If the program were set at 35 minutes long, and there were seven patients, each patient would receive a total of five minutes (which should be split into one minute intervals). It would also be useful to have performers bring a list of songs beforehand so that observations could be made to coincide with certain songs. Further, the observer would benefit from focusing on just one aspect of behavior (like facial expressions) instead of noting everything.

Overall, the quality of life of the patients was increased. Normally during this time of day, few activities were scheduled at the center and patients would spend their time on the unit wandering the halls or sitting and staring out the window. By the end of the study, the patients truly enjoyed coming to the music programs, and were much more involved than they were at the beginning. The morale of the nursing staff also improved; this was evident in their willingness by the end of the study to bring patients to the program in a more timely, prepared fashion. They also verbally recognized the benefits the sessions would have on the patients. Finally, all of the members of the Northampton Community Music Center that came to participate in the music programs would comment on the effect the session had on them. Most were moved by the reactions the patients would have to the music. These types of reactions from all parties facilitate the improvement of lives and strengthening of community.

References

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Figure Legend

Figure 1 is a graph of the average blood pressures (measured in millimeters of mercury, mmHg) for each patient (1 corresponding with A, 2 corresponding with B, etc.) for weeks 1-5 (11 sessions total). The blue points are the measurements taken at the start of the session while the pink points are the measurements taken at the end. There are two points for every measurement, the higher number being the systolic and the lower number being the diastolic.

Figure 2 is a graph of the average blood pressures for each patient for weeks 6-10 (13 sessions).

Figure 3 is a graph of the average blood pressures for each patient for weeks 11-15 (12 sessions).

Figure 4 is a graph of the average blood pressures for each patient for weeks 16-20 (14 sessions).

Figure 5 is a graph of the average pulses (measured in beats per minute, BPM) for each patient (1 corresponding with A, 2 corresponding with B, etc.) for weeks 1-5 (11 sessions total). The blue points are the measurements taken at the start of the session while the pink points are the measurements taken at the end.

Figure 6 is a graph of the average pulses for each patient for weeks 6-10 (13 sessions).

Figure 7 is a graph of the average pulses for each patient for weeks 11-15 (12 sessions).

Figure 8 is a graph of the average pulses for each patient for weeks 16-20 (14 sessions).

Table 1 shows the documented administration of *pro re nata* (PRN) medications, which are administered to patients on an as-needed basis, for behavioral problems in this instance. It summarizes the number of administrations to each patient by month.

Table 2 includes a summary of the most outstanding behavioral changes that were noticed among the patients through the twenty-week study.

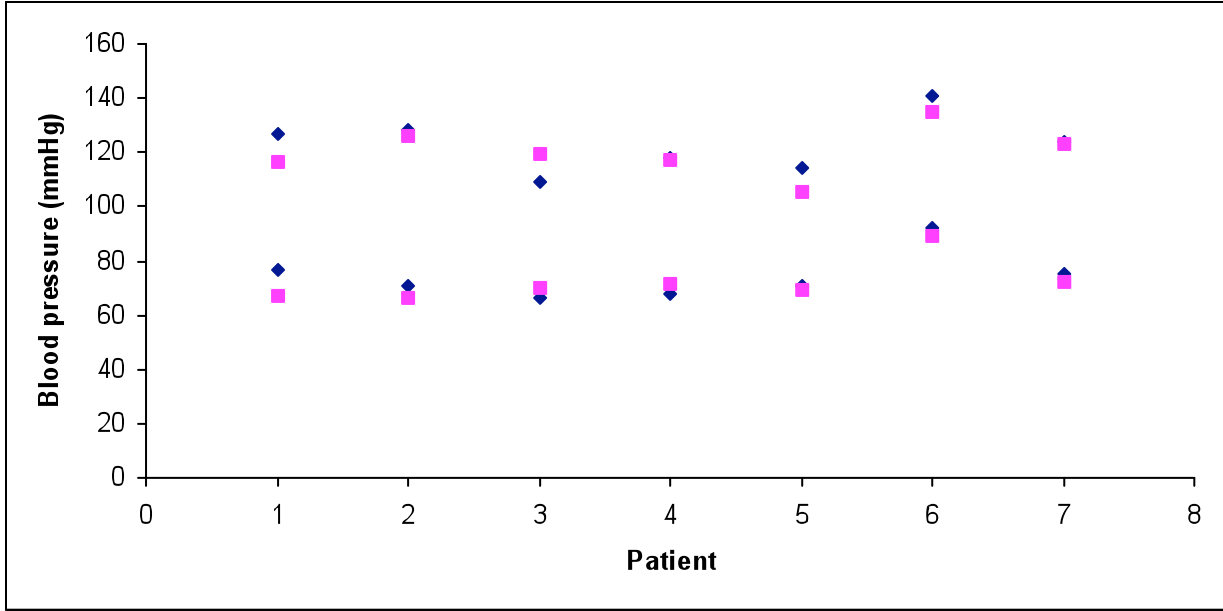


Figure 1

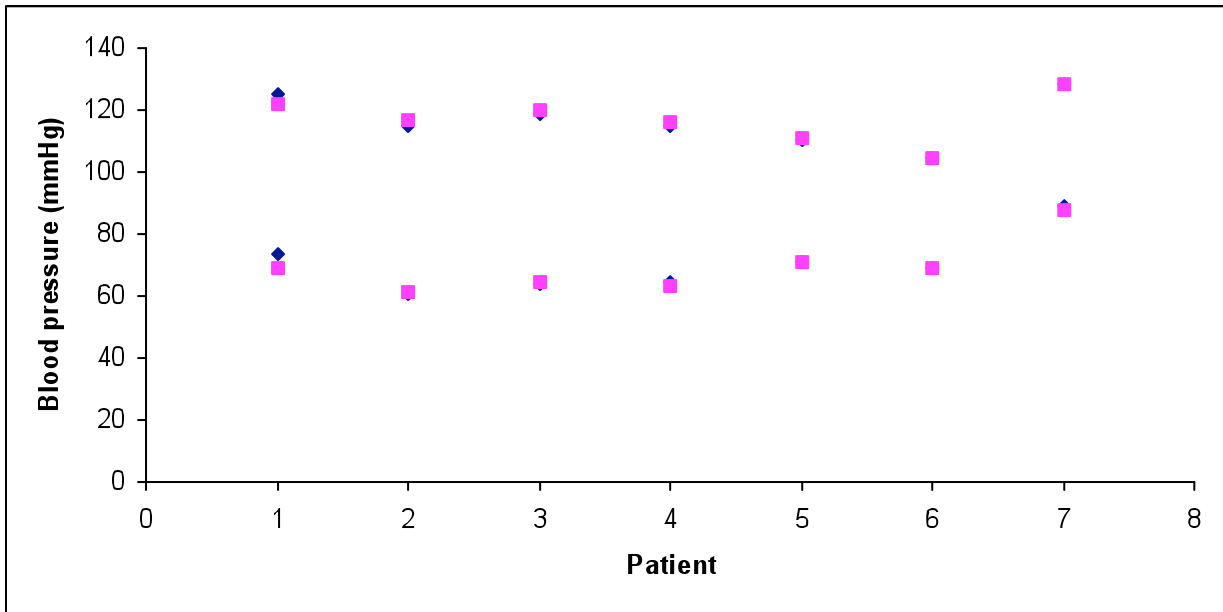


Figure 2

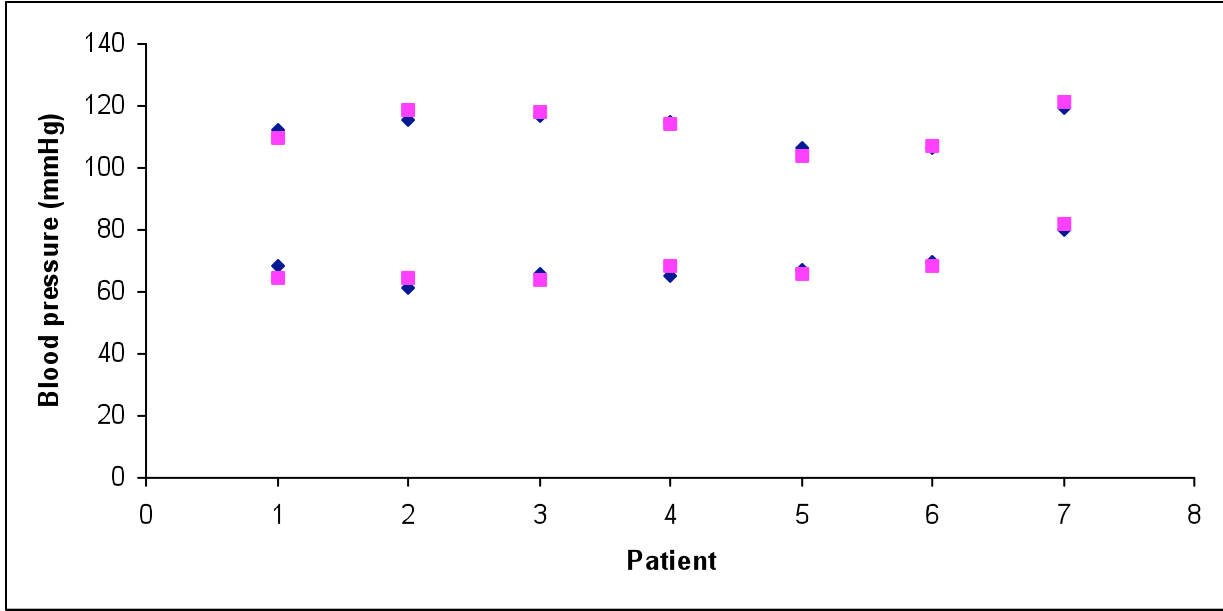


Figure 3

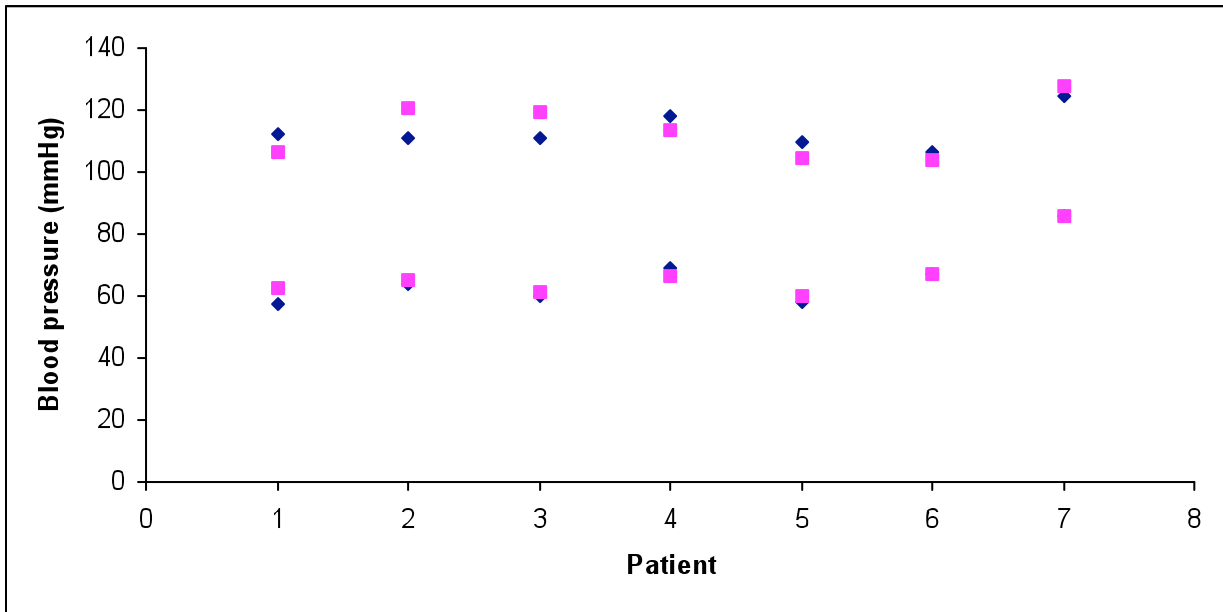


Figure 4

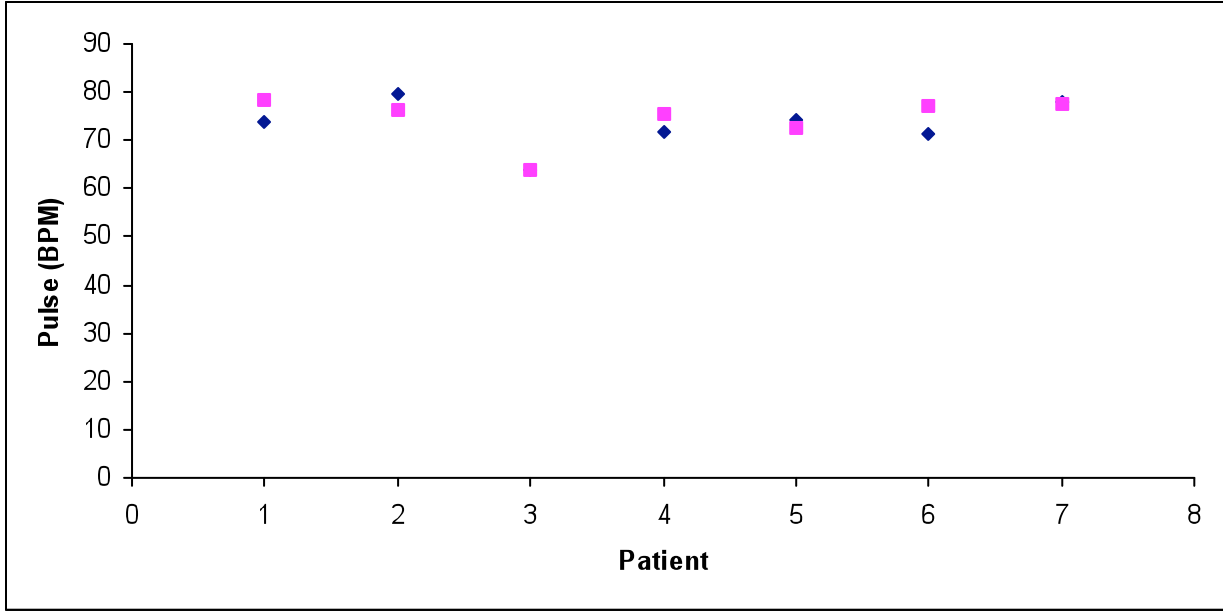


Figure 5

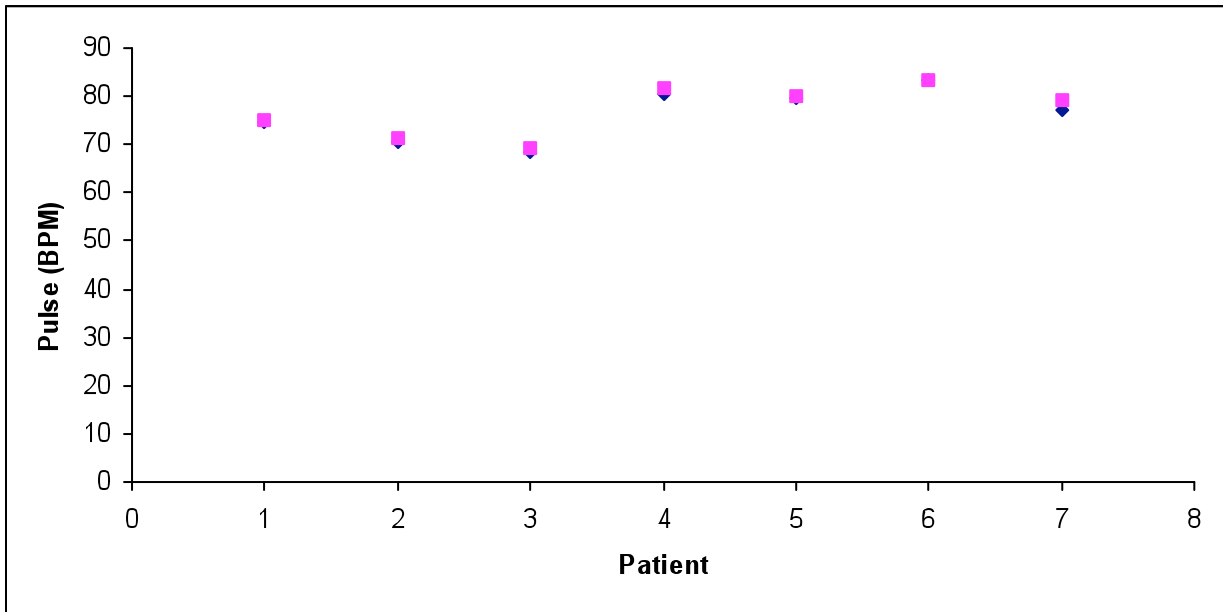


Figure 6

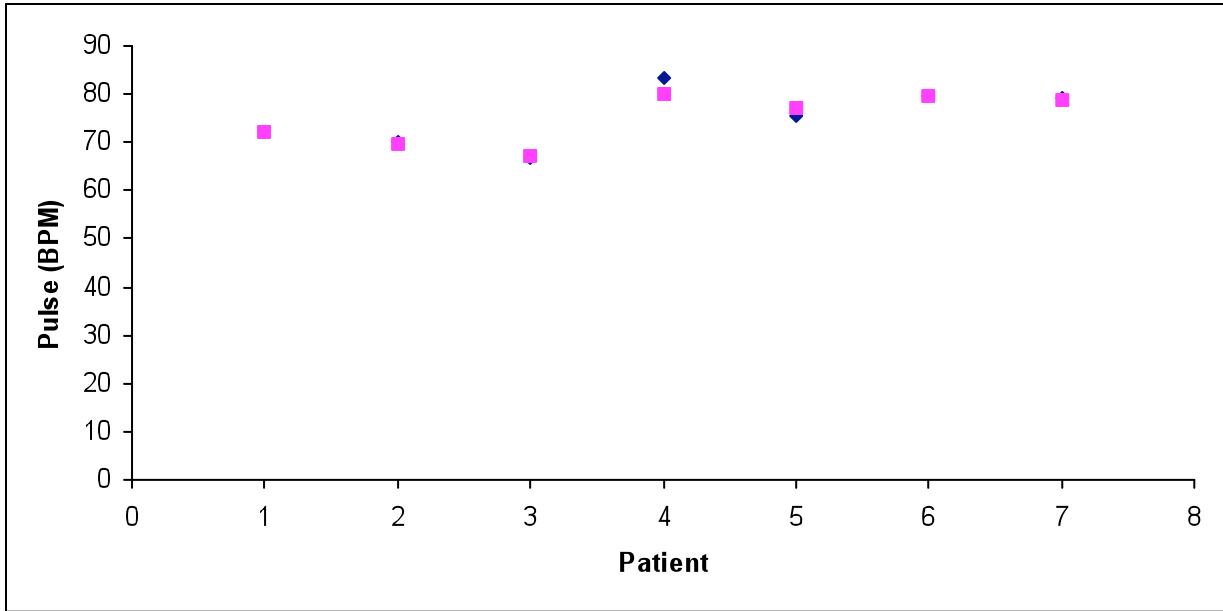


Figure 7

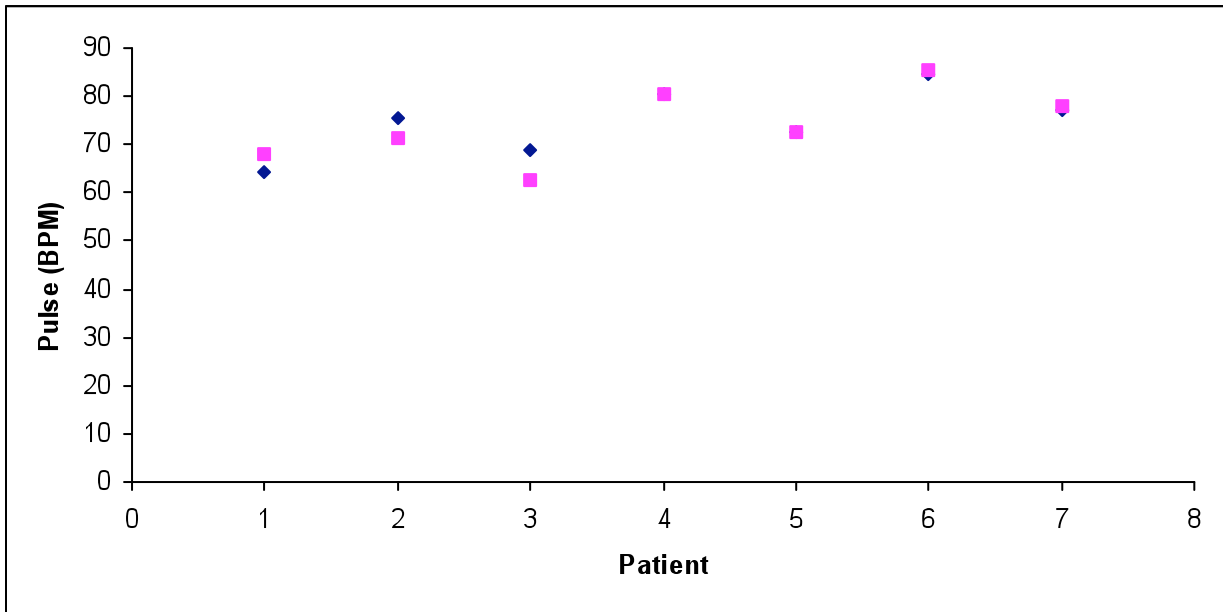


Figure 8

Table 1

	January	February	March	April	May
Patient A	0	0	Not available	0	0
Patient B	0	0	Not available	0	0
Patient C	0	0	Not available	Not available	Not available
Patient D	0	0	Not available	0	0
Patient E	4	0	Not available	1	2 (crossed out)
Patient F	1	0	Not available	0	0
Patient G	0	0	Not available	0	0

Table 2

	Participation	Talking	Mood	Movement
Patient A	Singing seemed to increase	No obvious change	Overall mood seemed to increase, enjoyed coming to programs by end of study (at the beginning was nervous and upset)	No obvious change
Patient B	No obvious change	No obvious change	No obvious change	Patient ambulated less during sessions than when on the unit
Patient C	Seemed more attentive, eyes open more often	No obvious change	No obvious change	No obvious change
Patient D	Singing increased, especially outside of sessions	Sociability definitely seemed to increase, talking to other patients and nursing staff increased	Overall improvement	No obvious change
Patient E	Slight improvement	No obvious change	Overall improvement	No obvious change
Patient F	Seemed to hum with music by the end of the study	No obvious change	Overall improvement, more relaxed, enjoyed coming by the end of the study	No obvious change
Patient G	Singing increased dramatically	Learned someone's name by the end of the study when she would ask daily, "Do you remember my name?"	No obvious change	No obvious change

