

ATTITUDES AND EXPECTATIONS ABOUT MUSIC THERAPY FOR PREMATURE INFANTS AMONG STAFF IN A NEONATAL INTENSIVE CARE UNIT

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Background • Music appears to reduce stress in premature infants, but little is known about the attitudes and expectations about music among clinicians caring for these infants. The study questions were: a) would staff like to have music played in the Neonatal Intensive Care Unit (NICU), b) would they prefer live to recorded music, and c) how would their attitudes be affected by their profession and experience?

Design • Cross sectional survey of NICU staff in the winter of 2003.

Methods • Eligible subjects were 37 physicians and 150 nurses and other clinical staff in the NICU. After pilot testing and revision, the self-administered questionnaires contained 57 Likert type or multiple choice items. They were distributed by email and in staff mailboxes with two reminders. Data were analyzed using simple descriptive statistics, Chi-square, and logistic regression.

Results • The response rate was 75%. Most were nurses and 27 were MD's. Most (84%) were female and most (70%) reported some previous musical training. The majority (68%) agreed that they would like to have music played in the NICU. Most agreed that music could reduce stress (86%) and crying (79%) and improve sleep (79%) in premature infants. Recorded was preferred to live music by more than 2:1. Attitudes were significantly associated with prior musical training, experience, and profession.

Conclusions • NICU staff holds favorable attitudes toward music for premature infants. Music's effects on caregiver attitudes, mood and behavior may contribute to its impact on infants. Evaluation of the

effects of music on infants needs to account for caregiver's expectations and behavior as well as direct effects on infants' physiology. (*Altern Ther Health Med.* 2004;10(2):50-54)

Illness and hospitalization are often stressful for patients.^{1,2} Stress has adverse effects on the cardiovascular, neuroendocrine, and immune systems, which may adversely affect recovery.^{4,6} In infants and children, acute and chronic stress may hinder the immune response to infection as well as interfere with sleep, appetite, digestion, growth, behavior and cognitive development.^{7,10} In addition to obvious physiologic stressors such as pain, premature infants are susceptible to environmental stressors such as cold temperatures, noise, and bright lights.^{11,14} For example, among infants hospitalized in the neonatal intensive care unit (NICU), excessive noise is correlated with a decrease in oxygen saturation, and an increase in heart rate and sleep disturbances.^{15,16}

Common techniques to reduce environmental stress in the NICU involve decreasing environmental stimuli such as keeping infants' isolettes warm, dark and quiet, and minimizing handling of the babies.^{17,18} Recently however, the use of structured stimuli for babies has been encouraged to reduce stress, using techniques such as massage, regular cycling of light and dark, and music therapy.^{17,19-23}

In premature infants, music decreases heart rate, salivary cortisol and distress behaviors and increases oxygen saturation and weight gain.^{23,24} For example, in a previous study of convalescent premature infants, we found that exposure to live harp music resulted in significantly lower salivary cortisol levels ($P=0.0002$) and lower respiratory rates ($P=0.0035$).²⁵ Whether the same effects might be achieved to the same extent less expensively through recorded music remains speculative.

Little is known about the physical, psychological or social mechanisms by which music achieves these physiologic effects. Although recent research has addressed individual patient preferences about music,²⁶⁻³⁴ fewer studies have evaluated music's effects on caretakers' attitudes, moods and behaviors which may indirectly affect patients.³⁵⁻³⁸ One study in a hospital operating room suggested that recorded music enhanced accuracy and autonomic reactivity among surgeons.³⁸ On the other hand, a similar study among anesthesiologists showed no impact on perfor-

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mance.⁴⁰ Some staff may even feel that playing music in the workplace interferes with performing tasks,⁴¹ and prefer silence to any type of music. Preferences may be affected by previous musical training, culture and experience.^{42,43}

Little is known about the comparative effects of live versus recorded music on infants' well-being. Musicians and many listeners believe that live musical performances have greater impact than recorded music because of the social interaction and responsiveness of the musician to subtle cues in listeners.⁴⁴⁻⁴⁶ However, these effects would be expected to be less prominent among premature infants housed in isolettes than in older patients in beds or chairs. Live music also has unique acoustical characteristics that may directly affect physiologic processes. However, live music is expensive and may intrude on nursing and medical routines more than recorded music.

Before embarking on a study to compare the effects of live versus recorded music on convalescent premature infants, we surveyed our Neonatal Intensive Care Unit (NICU) staff to assess their attitudes and expectations about the effects of live and recorded music on infants, parents, and on themselves as caretakers. Based on spontaneous comments from the previous study, our 3 major research questions were: a) would staff like to have music played in the NICU; b) would they prefer live to recorded music; and c) would their preferences be affected by their gender, profession, previous musical training or experience with having live music in the NICU?

METHODS

This was a cross-sectional survey conducted over 4 months in the winter of 2002-2003 at a tertiary care teaching hospital serving 19 counties in the Southeast United States. Subjects were eligible if they were faculty physicians, fellows, pediatric residents, nurses, or other clinical staff in the NICU. Clerks, secretaries, and financial administrators who did not provide clinical care were excluded.

The 5-page survey included questions regarding experience

with music, attitudes and expectations toward music for infants, expectations about the effects of music on parents and NICU staff, and demographic information about the respondent. The survey was based on recent surveys about attitudes and expectations about other complementary therapies such as acupuncture.^{47,48} It was pilot-tested in a group of 6 general pediatricians who did not work in the NICU and one pediatric resident who is also a musician (RS); it was revised slightly prior to general distribution. The final survey consisted of 57 items in multiple choice and Likert format, and it took less than 15 minutes to complete.

Accompanied by a cover letter from the study researchers and the Director of the NICU, the anonymous survey was distributed to physicians by both email and hard copy, requesting completion by an established deadline. Additionally, 150 hard copy surveys were distributed to nursing and associate staff in the Neonatal Intensive Care Unit (NICU) staff mail boxes. Two reminder surveys were distributed to staff as needed at 2-week intervals.

Survey responses were entered into an Excel spreadsheet and double-checked to ensure accuracy. Simple descriptive statistics (means, standard deviations and percentages) were determined using the Statistical Program for the Social Sciences (SPSS). Univariate associations of predictor variables with outcomes were assessed using Pearson Chi square methods, with Yates continuity correction for 2 x 2 tables. Multivariate associations using backward elimination logistic regression were determined with SPSS 11.0 (SPSS Inc., Chicago, IL). For the latter, $P < .05$ was required for statistical significance.

The study was approved by the Institutional Review Board.

RESULTS

Of 187 surveys distributed, responses were received from 141 (75%) subjects. There were 114/150 (76%) responses from staff (mostly nurses; and including respiratory, physical and occupational therapists; social workers and other staff) and 27 (73%) responses from physicians (faculty physicians, fellows and residents). Of the 141 respondents, most were female (84%), and the average was 36 years. All respondents had worked in the NICU within the past 12 months, and most (57%) had been present for live musical performances in a clinical setting, such as being present during the pilot study 2 years previously when harp music was performed in the NICU. We asked one question about whether the respondents had received any previous musical training, and 70% reported that they had received some training.

The great majority of respondents had positive overall attitudes about music being played in the NICU (Table 1). The majority (68%) agreed that they would like to have music in the NICU and 25% were not sure. When asked what types of music they felt would be best for the NICU, 80% preferred classical music to pop, rock or country; among instrumental music options, 66% preferred harp or acoustic guitar. Nearly all agreed that music can improve mood (99%) and can lift spirits, boost energy and improve vitality (96%). The vast majority also agreed that music can help relieve pain and enhance growth and recovery from injury and illnesses. Over 75% consistently disagreed

TABLE 1 General Attitudes about Music in the NICU

Statements for Likert Questions	Yes or Agree* N (%)	No or Disagree [†] N (%)	Not Sure N (%)
Music can improve mood.	139 (99)	0 (0%)	2 (1)
Music can lift spirits and boost energy and vitality.	136 (96)	0 (0)	5 (4)
Music can enhance growth and recovery from injury and illness.	111 (79)	1 (1)	29 (20)
Music can help relieve pain.	109 (78)	2 (1)	30 (21)
Music therapy is all fake	0 (0)	132 (94)	8 (6)
Music therapy only works for "New Age" types	1 (1)	130 (92)	10 (7)
Music is generally worthless when patients are very sick	5 (4)	108 (77)	28 (20)

* Agree and Strongly agree were combined

[†] Disagree and Strongly disagree were combined

with negative statements about music, eg, music only works for "New Age" types (92% disagreed).

Survey respondents generally expected that music would have positive effects on convalescent premature newborns (Table 2). For example, although noise was considered a source of stress by 89% of respondents, 86% agreed that music could reduce stress in infants. Nearly 80% agreed that music could help reduce crying and improve sleep behavior. Fewer than 5% believed that music would have any significant adverse effects such as delaying development, making babies more agitated or fussy, or causing any physiologic problem such as increased susceptibility to bleeding or infection.

Because music's effects on infants might be mediated through its effects on their caregivers, we asked staff about their expectations about the effects of music on parents, themselves and other staff in the NICU (Table 3). A strong majority (82%) agreed that playing music in the NICU would be such a positive experience that parents would be more likely to play music for their babies after discharge. Most (57%) expected that music would decrease parental stress during the NICU stay. None felt that it would make parents feel less competent in their own parenting ability.

Next we explored staff's expectations and attitudes about impact of music on themselves or other professionals in the NICU (Table 3). Most (56%) agreed that music would improve their ability to focus and perform required tasks. There was little concern that music would increase the frequency of their mistakes or interfere with interpersonal relationships.

Respondents were frequently unsure or disagreed about the impact of live versus recorded music in the NICU. Half (50%) of respondents were not sure whether live or recorded music would be best for babies, and 67% were not sure which would reduce

stress the most. When predicting whether they would be "as quiet as possible" or talk "over" music, substantially more predicted they would be quiet during live performances (61%) than when recorded music (34%) was played.

We explored the relationships among 4 key outcomes and 6 potential predictor variables. The key outcomes were 1) prefer to have music played in the NICU, 2) preference for live versus recorded music, 3) whether respondents would try to be quiet if live music were being played, and 4) whether respondents would try to be quiet if recorded music were played. The predictors were 1) respondents' musical training (any vs. none); 2) time per day spent listening to music (4 categories: <1 hour, 1-2 hours, 2-3 hours, and >3 hours); 3) respondents' prior exposure to live music in a clinical setting (any versus none); 4) age (3 groups: 21-30 yrs, 31-45 yrs, 46-70 yrs); 5) profession type (physician, nurse, other); and 6) gender. The desire to see music played in the NICU also was assessed as a predictor for the other three outcome measures.

In neither univariate nor logistical regression analyses was any key outcome significantly associated with respondents' gender, age, or amount of music listened to outside of work. In univariate analyses, respondents who reported any musical training were 2.3 times as likely to desire music in the NICU as those

TABLE 2 Expected impact of music on convalescent premature infants

Statements for Likert Questions	Agree N (%)	Disagree N (%)	Not Sure N (%)
Noise in the NICU contributes to infants' stress.	125 (89)	5 (4)	11 (8)
Music can reduce stress in newborns	121 (86)	0 (0)	20 (14)
Music can help reduce crying in newborns.	112 (79)	0 (0)	29 (21)
Listening to music could improve babies' sleep.	111 (79)	0 (0)	30 (21)
Music can help relieve pain.	109 (78)	2 (1)	30 (21)
Music can improve infants' cognitive development.	90 (64)	2 (1)	49 (35)
Music could improve infants' growth	68 (48)	5 (4)	68 (48)
Music could improve babies' appetite	26 (18)	27 (19)	88 (62)
Music might delay acquisition of developmental milestones.	0 (0)	116 (82)	25 (18)
Music makes babies more agitated and fussy.	4 (3)	113 (80)	24 (17)
Music could interfere with infants' sleep.	6 (4)	107 (76)	28 (19)

Percentage may add to more than 100% due to rounding

TABLE 3 Expected Impact of Music on Infants' Caregivers

Statements for Likert Questions	Agree N (%)	Disagree N (%)	Not Sure N (%)
<i>Expectations about Parents</i>			
Playing music in the NICU might make parents more likely to play music for their babies after discharge	115 (82)	0 (0)	25 (18)
Live music can decrease stress in parents	80 (57)	5 (4)	54 (39)
Live music in the NICU would increase parental satisfaction with care.	53 (38)	10 (7)	74 (53)
Playing music in the NICU might make parents feel less capable of caring for their infant	0 (0)	127 (91)	13 (9)
<i>Expectations about Staff</i>			
Music helps me focus and perform required tasks better	79 (56)	18 (13)	44 (31)
Having live music in the NICU would make me proud of my workplace	53 (38)	16 (12)	70 (50)
Music helps me focus and perform required tasks better	79 (56)	18 (13)	44 (31)
When someone is performing music, I will make more mistakes.	6 (4)	101 (72)	34 (24)
Having live music in the NICU interferes with my relationships with families and staff.	8 (6)	94 (67)	37 (26)
When recorded music (mobiles, CDs or tapes) plays in the NICU, other staff talk more than usual.	32 (23)	66 (47)	42 (30)
After awhile, I would just "tune out" live music and talk louder to be heard.	25 (18)	77 (55)	38 (27)

without such training (95% CI: 1.1-4.8; $P < .05$). However, in the multivariate analysis, both prior musical training (OR 2.2; 95% CI: 1.02 - 4.9, $P = .046$) and being a nurse (OR 2.7; 95% CI: 1.04-7.1, $P = .04$) or other healthcare professional (OR 5.1; 95% CI: 1.4 - 18.4, $P = .01$) versus a physician were both significantly associated with desiring music in the NICU.

In univariate analyses, nurses were 6 times as likely as physicians (95% CI: 1.7 - 21.6, $P = .006$) to state a preference for recorded music (vs. live or unsure). Also, those who had not experienced hearing live music in a clinical setting were three times as likely as those who had to prefer recorded music (vs. live or either) (95% CI: 1.4 - 6.2, $P = .006$). These associations remained statistically significant with similar strength of association in the multivariate analyses.

Two factors were associated with the expectation that one would be quiet when recorded music was played in the NICU: 1) desire to have music played (OR 2.5; 95% CI: 1.1 - 5.6, $P = .04$) and 2) being a nurse (OR 8.2; 95% CI: 1.8 - 36.8) or other health care professional vs. an MD (OR 9.4; 95% CI: 1.8 - 47.5, $P < .01$). These factors remained statistically significant with similar strength of association in the multivariate analysis.

CONCLUSIONS

Although previous research has demonstrated that music can positively affect newborn infants' physiology and clinical status, the mechanisms for these effects have not been elucidated. Because clinicians' attitudes may affect caretaking behavior, their expectations regarding music need to be assessed as potential confounders on the effects of music for patients.

As expected, the staff held strongly positive attitudes about having music played in the NICU. Favorable attitudes were especially common among those with prior musical training and among the non-MD staff. Respondents generally agreed that music can benefit mood, vitality, growth and recovering from injury and illness and that it can help relieve pain. Furthermore, staff expected that music could reduce infants' stress and crying and improve infants' sleep and cognitive development. They also strongly agreed that playing music in the NICU would benefit infants' parents, and that music could help staff focus and enhance performance of required tasks. Staff were not concerned about adverse effects of music on infants, parents or the likelihood that music would contribute to medical errors.

In terms of the type of music to be played, most staff favored instrumental music in a classical style featuring harp or guitar (acoustic). Nurses were 6 times more likely than physicians to favor recorded music versus live performance. This difference is understandable given the differences in daily work activities of physicians and nurses. A live performer takes up room, and may unintentionally interfere with nurses' tasks at the bedside. It also may be easier for physicians to adjust their work, altering their order of bedside rounds, to minimize interference by a live performer in the NICU. Also, out of deference and respect for the performer, nurses may talk less with one another when the performer is in their area; they may feel that the

"forced" silence may interfere with their ability to complete tasks quickly and efficiently. Physicians were much less likely to report that they would be quiet while music was played. Despite these differences in preferences regarding whether music was live or recorded, there was strong agreement that music itself was desirable, particularly classical music performed on harp or guitar.

This study has several limitations. It was conducted in one NICU in the southern US in which music is not routinely played. Results may differ for other settings in which staff routinely listen to the radio or CD's or in which music is played or in other NICUs with staff from different cultural backgrounds. The study questionnaire was not a validated instrument, though it was based on our previous surveys of CAM therapies and did undergo pilot testing. Many of the staff seemed unsure or ambivalent about the effects of different types of music on them; this may have reflected true uncertainty or simply a desire to avoid picking the "wrong" answer. Furthermore, the survey design did not actually measure staff behavior, parental behavior, sound levels or effects on infants' physiology, behavior or clinical status. The results are strengthened by the high response rate, the diverse sample, which included physicians, nurses and other staff, and the fact that at least half of the staff had prior exposure to live performance in the NICU, making their attitudes and expectations at least somewhat informed by experience.

Future research assessing the effects and mechanisms of music therapy for premature infants should consider the results of this study. NICU staff are not neutral with regard to music. They desire it and they expect that it will positively affect infants, parents and their own work performance. These expectations can certainly contribute to a desirable placebo effect through changes in caregivers' attitudes, moods and behavior. For example, if staff are more relaxed or talk less to each other while music is played, they may be more attentive to the infants in their care. Playing music softly may also decrease the overall noise level in the NICU. However, when the music stops, there may be a rebound increase in staff talking and overall noise level, making control periods appear even worse than normal.

Music is complex. Its effects on premature infants are likely to be complex as well, and many of these effects have not been evaluated. Researchers and clinicians need to account for indirect effects on the physical, social and caregiving environment as well music's direct acoustical effects in order to better understand the mechanisms by which it and other CAM therapies enhance well-being in this and other patient populations.

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