

Brief Report: Background Music Does Not Diminish Recall of Information during Handoffs between Anesthesia Providers

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Abstract

Background: Transfers of care between healthcare providers are a focus of recent patient safety efforts. Anesthesia providers often transfer care in noisy operating rooms where music or other noise is present during the handover. This study aimed to determine if presence of background music during an intraoperative handoff between anesthesia providers affected quality of handoff and subsequent recall.

Methods: Anesthesia providers including staff anesthesiologists, anesthesia residents, Certified Registered Nurse Anesthetists (CRNA), and Certified Anesthesia Assistants (C-AA) were recruited to participate in this prospective randomized comparative trial. Anesthesia providers (N=19) were randomized into one of two study groups: presence or absence of background music during transfer of care. Experimental and control groups received verbal handoff in their respective sound environments. After five minutes the study participants were given a data collection form and asked to recall as much information from the transfer of care as possible.

Results: Nineteen anesthesia providers participated in the investigation. Initial descriptive analysis showed that the total scores for the control group (no music) had a lower average score based on the correct answers (18.89 vs. 24.1 out of 44) but smaller standard deviation (3.9 vs. 5.8) compared to the experimental group (music on) (CI 95%, P=0.037).

Conclusion: The presence of background music playing in a simulated operating room did not impair the ability of the anesthesia providers to recall information from a transfer of care from another anesthesia provider.

Introduction

Patient safety has become increasingly important in recent years as hospitals and regulatory bodies spend substantial time and resources on eliminating medical errors [1]. Transfer of patient care from one medical provider to another has been a focus of many of these efforts. To this end, a great deal of research has focused on development, implementation, and effectiveness of patient handoff tools [2]. However, less research has been published on the context in which such handoffs take place and the effect of that context on their quality. Recent work has demonstrated that undivided attention during handoff from anesthesia providers to post-anesthesia care nurses following surgery improves recall of the information provided [3]. Preliminary work has shown that intra-operative handoffs between anesthesia providers are suboptimal, often containing insufficient information [4]. Transfers of care between anesthesia providers often take place within a noisy operating room. In fact, noise levels in the operating room have been shown to vary between 46 and 106 dB (equivalent to a power lawn mower at a distance of three feet) [5], and in many cases to exceed 120 dB at their peak [6]. No research has looked specifically at the effect of the operating room noise on intra-operative handoffs between anesthesia providers. This pilot study demonstrates that presence of background music during an intraoperative handoff between anesthesia providers actually improves its quality. We further discuss the implications of this finding and offer suggestions for future work in this area.

Methods

After obtaining institutional review board approval, anesthesia providers including staff anesthesiologists, anesthesia residents, Certified Registered Nurse Anesthetists (CRNA), and Certified Anesthesia Assistants (C-AA) were recruited to participate in this single-blinded prospective randomized comparative trial. Anesthesia providers (N=19) were randomized into one of two study groups: presence or absence of background music during transfer of care. Randomization occurred when study participants chose a blank sealed envelope containing the treatment assignment. This was then presented to the research assistant without revealing the

Table 1: Randomization results and demographic data of 19 anesthesia providers participated in the investigation.

| | Music Off (n=9) | Music On (n=10) |
|--------------------------------|-----------------|-----------------|
| Residents and Attending | 6 | 5 |
| Anesthetists | 3 | 5 |
| Male | 8 | 5 |
| Female | 1 | 5 |
| Mean Age (years) | 41.3 (±4.84) | 33 (±1.45) |
| Mean Experience (years) | 14.3 (±4.77) | 5.05 (±1.14) |

assignment to the study participant. Each participant was given a scripted briefing by a research assistant that described the general purpose of the study without revealing the exact methods or data to be collected. Participants in the control group received a verbal transfer of patient care, or handoff, in a quiet simulated operating room with normal ambient sounds. The experimental group was subjected to moderate background noise with a standardized music soundtrack playing at 85 dB in addition to ambient sounds. Study participants each received the handoff from the same research assistant according to a standardized script. Requests for repetition of the handoff information were granted according to the same script, but the research assistant providing the handoff did not provide any new or extraneous information if asked. Following transfer of care, the research assistant who provided the handoff exited, leaving the study participant to care for the simulated patient for five minutes. During this time the patient simulator remained hemodynamically stable and the simulated operation proceeded uneventfully. After five minutes the study participants were given a data collection form and asked to recall as much information from the transfer of care as possible. During the recall period, a maximum of five minutes, study participants remained in either the control or experimental environments. Upon completion of the data collection form participants were debriefed as to the nature of the investigation by a research assistant. Data collection form scored using a standardized rubric and were tabulated and analyzed using IBM SPSS Statistics Version 23.

Results

A total of 19 anesthesia providers participated in the investigation over two non-consecutive days. Randomization results and demographic data are shown (Table 1). All participants completed the investigation according to protocol, and all completed the data collection form within the allotted five minutes. Initial descriptive analysis showed that the total scores for the control group (no music) had a lower average score based on the correct answers (18.89 vs. 24.1 out of 44) but smaller standard deviation (3.9 vs. 5.8) compared to the experimental group (music on) (CI 95%, $P=0.037$). Independent t-test was used for comparative analysis. Levene's test for equality of variance showed that the two groups are assumed to have equal variances.

Discussion

The results of this prospective, randomized pilot investigation suggest that the presence of background music during an intraoperative handoff between anesthesia providers does not impair the ability of the provider assuming care to recall details about the

patient. While this result was certainly surprising, there is ample evidence from other scientific disciplines to support this finding. A brief review of the literature reveals that sounds and background noise have different effects on learning behavior, attention, and recall. Thus, we propose several possible explanations for the current finding and suggest directions for further research in this area.

One possible explanation for the increase in recall by participants subjected to a noisier environment is that background music is much less distracting than other possible sounds such as spoken voice, alarms, or random noise events (i.e. pager or telephone). In a study assessing maximum Acceptable Noise Level (ANL) while listening to speech, it was determined that the maximum ANL for music was higher than for twelve-talk babble, indicating that listeners were more willing to accept music as a background noise than speech babble [7]. Not surprisingly, field studies have demonstrated that irrelevant noises (i.e. telephones ringing at a nearby empty desk) are almost universally detrimental to workers' concentration [8] whereas background music has been shown to have a more varied influence on attention and recall [9,10]. The control condition in our study was designed to represent the realistic conditions of a "quiet" operating room in which there are still distracting ambient noises including monitors, talking, and the movement of surgical instruments. These irregular sounds may have served as a more distracting element than the relatively consistent background music and, hence, decreased retention and recall ability.

We chose to use background music as the distractor in our experimental condition due to the fact that music is routinely played in operating rooms during surgical procedures [11] and, in fact, have been shown to decrease performance of novice surgeons during certain procedures [12]. We specifically chose a "Top 40" style playlist of popular music that included lyrics because this seems to be the preference of most surgeons not only in our institution, but more broadly as well [13]. There is literature to suggest that different types of music may have variable effects on psychomotor performance based on the personal preference for music type [9,14]. Therefore, it is possible that those who either strongly liked or disliked the music may have been influenced to a greater degree. However, our study was not designed to take into account the musical preferences of the participants. Further work will be needed to determine the degree to which preference for different styles of background music affect verbal transfers of care, if at all.

This pilot investigation has important limitations that will serve as opportunities for further research. First, we were only able to recruit 19 total participants during the study. While this represented almost all of the residents in our department, it only included about half of the anesthetists and only a small fraction of the staff anesthesiologists. A larger sample size would have allowed for additional experimental groups being subjected to different distractors and/or at varying volumes. Also, the demographic data we collected on the participants was limited to age, gender, years of experience, and training type. More detailed information on the participants including music preferences, personality profiles, and learning styles may have been beneficial in elucidating the underlying reason for our results. Finally, many institutions, including our own, routinely use some form of written handoff tool to supplement verbal transfers of care. For the purposes of this study, we did not provide the participants with any form of written materials. This represented a departure from the

normal protocols of daily practice, and thus, may have artificially depressed the recall ability of those anesthesia providers who rely more on the written form than on verbal communication.

Despite the limitations, our study produced a significant result: Background music played at normal operating room volumes during a transfer of care between anesthesia providers did not impair the ability to recall the information provided. Further research exploring the effects of different types of distractions as well as inter-provider variability is needed to determine the safest practices during these critical transfers of care.

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