Noise Pollution in Hospitals – A Study of Public Perception

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Abstract

Introduction: Hospitals are categorized under silent zone, but noise pollution in this setup is inevitable. The noise in hospitals may have adverse effects on the patients, caregivers and professionals working in hospitals. Aim: The aim of the study was to determine awareness of public regarding noise pollution in hospitals, its health effects and mitigation measures. Method: The present study was an internet-based questionnaire survey. The questionnaire consisted of a common Section-I for all participants and an additional Section-II for participants of the study who were Audiologists. Descriptive statistical analysis was done on the acquired data. Results: 174 completed questionnaires were received and analysed, out of which 108 were general public and 66 were Audiologists. The data analysis revealed that the public is aware of the presence of noise in hospitals, some of its overt health effects and measures that can be taken to control the noise pollution in hospitals. Only 22.7% Audiologists who participated in the study were aware of the more technical aspects like permissible noise level in hospitals and their response was similar to that of the general public. Conclusion: Though the public is aware of some of the basic facts related to noise in hospitals, there is a need to create public awareness and to train Audiologists regarding hearing conservation program in hospital setups.

Keywords: Audiologists, effects of noise, hospitals, noise pollution, public awareness

INTRODUCTION

Noise is an integral part of the modern society. Various sources generate noise continuously or intermittently and with varying acoustic properties. [1] Traffic and industry are some of the most common sources of noise in our environment. Other human activities also generate noise. In layman terms, ‘noise is any unwanted sound’ indicating that it depends on human perception of annoyance and noisiness. [1] According to the Indian Noise Pollution (Regulation and Control) Rules (2000), ‘ambient noise is all encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far. Any abnormal sound which irritates human being is called as noise pollution’. [2] So, sounds that one individual considers noisy may not be perceived as noise by another individual.

Noise is considered a health hazard as it can have various adverse effects on human body. Noise can have auditory and non-auditory effects on human beings which can affect their quality of life. Auditory effects of noise include temporary or permanent hearing loss, tinnitus, diplacusis, hyperacusis and distortions. [3-5] The non-auditory effects of noise exposure can be seen on various systems of the body and also on the psychological health of the individual. [6-7] This can affect the individual’s health, personal, social and professional life to varying extents. In some conditions, there may be various other factors which may be present along with noise exposure that may worsen the perceived adverse effects.

Various standards or laws have been set to control these adverse effects of noise on human life. When the noise level exceeds the set limit, noise pollution becomes evident. According to the Noise Pollution (Regulation and Control) Rules (2000) in India, silence zones like hospitals are supposed to have noise level of only 50 dB(A) Leq during day time and 40 dB(A) Leq at night time. [21] There are certain forms of noise that go unnoticed in hospitals which can actually have adverse effect on the patients as well as the professionals working in the hospitals. Some of these sounds...
include the noise of various instruments, a large group of people speaking in the waiting areas, generators, ambulance and sirens.\cite{18-13} Literature reveals that these noise levels cross the standard limits in most of the hospitals and have auditory as well as non-auditory effects in patients and the hospital staff.\cite{12,14}

Patients and other people in the hospital may be more affected by the non-audiological effects of noise than the auditory effects.\cite{10,12,15-17} Individuals working in hospitals may not be aware of the risk of occupational noise-induced hearing loss (ONIHL) when they use certain equipments/instruments/tools for various purposes.\cite{17,18} This increases the risk of detection of hearing loss at a later stage which further complicates the hearing conservation program.\cite{19}

Audiologists, who are professionals trained in assessment and rehabilitation of auditory disorders, are expected to know about effects of noise and generally study it as a part of their curriculum. So if people visiting hospitals or working in a hospital setups, which are ideally silent zones, are not aware of the risk of noise pollution in hospitals, it is the responsibility of the audiologists to create awareness.

The aim of the study was to determine awareness of patients and hospital professionals, including Audiologists, regarding noise pollution in hospitals, its health effects and mitigation measures.

**METHOD**

The study was designed as a cross-sectional internet-based survey. The questionnaire contained 11 questions which sought to collect information regarding the awareness about noise pollution in hospitals. The questionnaire had two sections. Section-I contained six questions which had to be answered by all the participants of the survey. This section had general questions related to noise in hospitals, its perceived effects on patients and hospital staffs, and the measures that can be taken to reduce this noise. The Audiologists who participated in the study had to complete an additional Section-II in the questionnaire. Five questions were framed to analyze their awareness regarding specific information related to noise-induced hearing loss that Audiologists should be aware of. The questions were either multiple choice questions or open-ended questions. The questionnaire was checked for readability and face validity by five experienced audiologists.

After receiving clearance from the ethical and scientific committee of the Institution, the URL link to the internet-based questionnaire was forwarded to public through social media. Data was collected by snowball sampling as participants were instructed to forward the link to as many people as possible. Only completed questionnaires received within 1 month from the start of the survey were included in the study. Descriptive statistics were used to analyze and interpret the collected data.

**RESULTS**

A total of 174 completed questionnaires were received within a span of 1 month. Of these, 96 responses were of professionals working in different occupational sectors like medical, paramedical/allied medical, engineering, teaching, finance. 66 participants were Audiologists and 12 participants were students. The mean age of the participants was 24.45 (±7.12) years. Out of the 174 participants, 108 participants who were general public were considered as Group 1 and the 66 Audiologists were considered as Group 2. The results of descriptive analysis are present in the following section.

**Section-I**

Section-I has responses from 108 in Group 1 (general public) and 66 in Group 2 (Audiologists). 54.6% in Group 1 and 66.7% in Group 2 were aware that hospitals come under silence zone according to the Noise pollution rules (2000). When asked to enlist the sources of noise in hospitals, the responses of Group 1 and Group 2 were similar. They included the noise generated by instruments, vehicles, people speaking, electronic devices, cafeteria noise, etc as the sources of noise in hospitals as seen in Figure 1.

Both the groups reported that noise has adverse auditory, psychological and physiological effects on the patients which are represented in Figure 2.

The steps suggested by both the groups to reduce noise from the various sources are seen in Figure 3. It included taking strict action in cases of violation of noise pollution rules, placement of sign boards to maintain silence, maintain noise from vehicles and making parking lots at a distance, organizing awareness programs, making spacious waiting areas to control crowd, using sound absorbents and sound-treated rooms wherever required, maintenance of instruments to reduce noise etc.

49.1% in Group 1 and 62.1% in Group 2 stated that they think even hospital staffs are at risk of being affected by noise at work place. Group 1 who work in hospital setups (other than audiologists) was asked to describe how noise at their work place affects them. They reported to have problems related to emotional variations, lack of concentration, hearing loss, physiological changes, work efficiency etc. which are presented in Figure 4.

**Section-II**

The responses of 66 audiologists to more technical questions are documented in this additional section. Only 22.7% in Group 2 responded correctly that the standard noise limit for silence zone is 50 dB(A) L_{eq} during day time. 19 Audiologists feel that all hospital staffs are at risk of experiencing ONIHL. Others have specified professionals like dentists, surgeons, drivers, and maintenance workers are at higher risk of ONIHL [Figure 5]. Figure 6 shows the equipments/tools that can be sources of noise for these hospital staff according to audiologists.
Few of the steps suggested by audiologists for hearing conservation amongst hospital staffs used ear protective devices, routine audiological evaluation, and changes in shift timing [Figure 7].

78.8% audiologists in Group 2 opined that inclusion of ‘Effects of noise and its management in hospital setups’ in the curriculum may help the budding Audiologists in planning hearing conservation programs and noise reduction strategies in hospitals.

**DISCUSSION**

Many times places like hospitals and schools, which come under silence zone, may be overlooked during noise pollution surveys. This study helped to comprehend the actual
Majority of participants in the study are aware of effects of noise on the general health of every individual in the hospital, especially patients and hospital staffs. The effects of noise that they have described are in agreement with the findings in literature. Literature reveals that noise can disrupt their healing process and affect their emotional and psychological health. Sleep disturbances and mood swings may be most common effects seen in patients. Instruments used in the ICU and during the surgery can lead to temporary or permanent hearing loss.
in the patients. It also affects the hearing of the doctors and nurses and leads to poor work performance and satisfaction. Emotional changes and lack of concentration have also been reported by the hospital staff. Infants placed in NICU are at high risk of NIHL as noise present in the chamber usually exceeds 100 dBSLP. Surgical equipments, monitoring machines, bone drills, metal sterilizers, sirens, suction pumps and other life support systems which are present in general wards, ICUs and operation theatres are known sources of indoor noise. Medical Imaging technicians work with equipments which are known to have noise output of more than 100 dBSPL depending on the type of instrumentation. Patients who undergo MRI examination are at risk of temporary threshold shift. The outdoor sources of noise in hospitals include people speaking, metal stretchers and wheel chairs, generators, ambulance, traffic, laundry, cafeteria and kitchen area.

Many of the participants in this survey are not aware that hospitals are silent zones and have rules which are laid down to control and reduce the noise generated by these sources. This indicates that public needs to be made aware of the legislations related to noise control so that the adverse effects of noise pollution can be reduced. The suggestions given by general public in this study to reduce noise pollution in hospitals to carry out their responsibilities of creating public awareness, screening and identification of the auditory and non auditory effects of noise in patients and hospital professionals and the remediation strategies available to overcome the same. As suggested in the survey, this can be achieved by including noise pollution in hospitals in the Under Graduate curriculum for students of Audiology and Speech Language Pathology.

CONCLUSION

Noise in hospitals can be a real nuisance to patients and hospital staff. Need for public awareness, staff training, making stricter rules to regulate noise in hospitals and charting a hearing conservation program for patients and staff who are at risk of noise induced hearing loss are few of the aspects related to noise hospitals that were highlighted in this study. As audiologists, we should be feverous to acquire knowledge about technical and legal aspects of noise to make better prevention and rehabilitation plans for individuals who are affected by noise pollution in hospitals.

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Conflicts of interest
There are no conflicts of interest.

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