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Noise levels in the hospital environment in Ibadan

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Summary

Noise levels were measured in 3 hospitals in Ibadan; a teaching hospital with approximately 800 beds and 2 general hospitals with about 200 beds each. A type 2 digital integrating sound level meter was used to measure noise levels in selected sites. Children's clinics and wards in the teaching hospital recorded the highest noise levels, 68-73db(A) and 55-77db(A) respectively, compared to similar facilities for adults. High noise levels 74-89dB(A) were also recorded in the operating rooms. Noise levels above 80db (A) were recorded in service areas such as the boiler room, and laundry and generator rooms in the teaching hospital. Corresponding sites in the general hospitals were less noisy as such services are provided at a minimum in these hospitals. Sleep interference is known to occur at noise levels recorded in this study. Staff conversation makes a large contribution to noise levels in patient care areas. The use of hospital equipment in patient care also contributes to the noise levels especially in operating room. This can be reduced if attention is drawn to this as an important part of patient care. Noise levels in service areas need to be monitored closely and workers in those areas may need hearing protection and regular audiometric assessment.

Keywords: Noise levels, hospital environment, health care setting

Résumé

Les niveaux du bruit ont été mesurés dans 3 hôpitaux dans Ibadan, un hôpital de l'enseignement de plus ou moins 800 lits et 2 hôpitaux généraux avec approximativement 200 repiquent chacun. Dans les emplacements sélectionnés, les niveaux du bruit a été mesure en utilisant un type 2 intégrant mètre de niveau avec sain numérique. Les cliniques d'enfants et les salles dans l'hôpital de l'enseignement a enregistré le plus haut niveau de bruit, 68-73db(A) et 55-77db (UN) respectivement, comparé aux installations semblables pour les adultes. Le niveau de bruit 74 - 89dB (UN) est

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aussi enregistré dans les salles d'opération Le niveau de bruit au-dessus de 80db (UN) a été enregistré dans les régions du service tel que chaufferie, lessive et le générateur partage un logement dans l'hôpital de l'enseignement. Les emplacements correspondants dans les hôpitaux généraux étaient moins bruyants comme services tels est fourni à un minimum dans ces hôpitaux. L'intervention du sommeil est note aux niveaux du bruit enregistré dans cette étude. La conversation du personnel fait une grande contribution au niveau de bruit dans les régions du soin de patientes. L'usage de matériel de l'hôpital chez les patientes contribue aussi surtout aux niveaux du bruit dans la salle d'opération. Comme une partie importante de soin de patient, il faudra une attention a réduire ces bruits. Le niveau de bruit dans les régions du service a besoin d'être dirigé attentivement et les ouvriers dans ces régions peuvent avoir besoin d'une protection d'entendre et une estimation souvent de l'audiométrie.

Introduction

Noise levels in the general environment is a public health issue especially in industrialized countries. The workplace is a well known source of noise pollution in the environment [1]. Noise is frequently associated with factories and manufacturing industries. However, this hazard is often present in service industries. There is little control of noise levels in the general environment in Nigeria but noise control legislation within the work environment require that levels should not exceed 90db(A).

The hospital is a service industry which provides health care to the public and is not expected to be a source of noise pollution in the environment. However, several publications indicate that there is some concern among staff and patients about noise levels in the hospital environment [2-4]. Specifically, noise levels in operating theatres and children's wards have been highlighted. As there is little or no data on noise levels in hospitals in Nigeria, this survey was carried out in 3 government hospitals in Ibadan to determine the noise levels in the environment and to identify specific locations with a noise hazard in the hospital environment.

Materials and method

Noise levels were measured in 3 hospitals in Ibadan: the University College Hospital, a teaching hospital and 2 general hospitals, Adeoyo General Hospital, Ring Road and Adeoyo General Hospital, Yemetu. These 3 hospitals were selected purposively because they are the largest hospitals in Ibadan, the capital of Oyo State. The University College Hospital, a Federal government owned tertiary institution, equipped with 800 beds, is the oldest teaching hospital in the country. It has 55 service and clinical departments and runs 75 consultative clinics in a week. The hospital has a generating plant, various laboratories, a laundry, a large kitchen, cafeteria and waste management facilities. Adeoyo General Hospital, Yemetu

Table 1: Noise levels db(A) in selected sites in 3 hospitals in Ibadan

| | | | Adeoyo | Adeoyo |
|---------------------------------|----------------|--------|-----------|--------|
| Sites | | UCH | Ring Road | Yemetu |
| Clinic waiting areas | | | | |
| Medical Outpatient | | 61-65 | 69-76 | |
| Childrens' Outpatient | | 68-73 | | 64-69 |
| Ear, Nose and Throat | | 56-61 | | |
| Surgery | | 52-59 | 69-74 | |
| Staff | | 51-59 | | |
| Pharmacy | | 56-61 | 58-60 | 52-66 |
| Antenatal /Gynaecolo | gy | | 63-77 | 68-77 |
| Offices | | | | |
| With Air-conditioner | | 80 | | |
| Background level | | 52-56 | 42-51 | 54-62 |
| Typing (manual) | | 68-74 | 51-70 | 62-72 |
| Corridor | | 50-55 | 46-49 | 59-67 |
| Laboratories | | | | |
| Medical Microbiology | | 56-60 | 69-75 | 57-62 |
| Haematology | | 56-62 | 67-68 | 40-59 |
| Haematology Centrifuge | 2 | 75-76 | 77-78 | 80-82 |
| Morbid Pathology | | 60-62 | 54-59 | |
| Centrifuge in use | | 72-74 | | |
| Chemical Pathology | | 62-66 | 63-69 | 64-68 |
| Centrifuge in use | | 71-73 | 66-70 | |
| Wards | | | | |
| Surgical | | 66-68 | 68-72 | |
| Paediatrics | | 55-77 | | 64-80 |
| Medical | | 53-56 | 56-65 | |
| Obstetrics | | 49-54 | 51-56 | 52-55 |
| Gynaecology | | | 59-64 | |
| Operating theatre | | | | |
| Induction room | | 42-50 | | |
| Operating room | | 74-89 | 48-52 | |
| Intensive care unit | | 44-47 | 49-55 | |
| Service areas | | | | |
| Boiler room | 86-87 | 38-47 | | |
| Laundry | 80-82 | *55-58 | *58-65 | |
| Ironing machine in use | 90 | 461 66 | +60.77 | |
| Kitchen Engingering workshop | 78-80 60-76 | *51-55 | *59-67 | |
| Generator room | 104-108 | 99-100 | 95-07 | |
| * no equipment in use | | | 15-11 | |

provides Maternity and accident and emergency services and Ring Road General Hospital provides all other services. They have 200 beds each. These two general hospitals are owned by the Oyo State government and they serve as referral centres for several primary health care facilities in Ibadan and other parts of the State.

Various sites on the premises of the 3 hospitals were surveyed including clinics, wards, laboratories, offices, kitchens and laundry rooms. These sites were purposively selected to reflect the various areas of activity in the hospital environment. The sites were visited during the morning hours when patient care activities in the hospitals are at the peak. Noise levels were measured using a Type 2 digital integrating sound level meter CEL 269 (CEL Instruments U.K. Ltd.). Noise levels were measured on the weighted scale of decibels dB(A).

Results

The table shows noise levels recorded in the 3 hospitals. Noise levels in the clinic waiting areas ranged from 51 to 73 dB(A). Noise levels were highest in the children's outpatient department. Noise levels in the wards ranged from 55 to 80 dB(A).

Again, the highest levels were recorded in children's wards. Noise levels in the wards were related to the number of patients on admission. Surgical wards were the most highly populated and recorded the highest noise levels among the adult wards in the 3 hospitals. Noise in the operating room during a surgical procedure ranged from 74 to 89db(A). The range of noise levels in laboratories was 56 to 66 dB(A) and levels rose to 72 to 76(A) when the centrifuge was in use. Noise levels in offices ranged from 50 to 56 dB(A) and rose up to 80 dB(A) with air conditioner on. Manual typewriters also increased noise levels in offices to 74 dB(A). The kitchen, laundry and boiler room in the University College Hospital had the highest noise levels in the hospital environment. Noise levels in the boiler room were 86 to 87 dB(A) and 80-82 dB(A) in the laundry. Noise levels recorded in the laundry rooms and kitchen in the general hospital ranged between 51 and 67 dB(A).

Discussion

Noise has been defined as unwanted sound. When sound interferes with work, impairs verbal communication or prevents sleep, it becomes objectionable. The physiological effects of noise include peripheral vasoconstriction and the stimulation of hypophyseal adrenocortical axis with consequent release of ACTH. These effects occur at noise levels of about 70db(A) and 68db(A), respectively [5]. Sounds greater than 85db are potentially hazardous [6].

The noise survey in the 3 hospitals revealed that noise levels were comparable except in the service areas The 2 general hospitals did not have a full compliment of clinic and ward facilities as did the teaching hospital and their service units were either closed down or nonfunctional. However, noise levels in the patient care areas were mostly within the range of 50-70 db(A) and exceeded 70db(A) in surgical and paediatric clinics and wards. Other studies have reported unacceptable noise levels in children's wards [2,3,7]. The sources of noise in children's ward as documented by Keipert [2]includes cleaning machines and crying infants. High noise levels in wards has been associated with the number of patients [5]. The surgical wards had the highest occupancy rates in the hospital and this probably accounts for the higher noise levels. Noise produced by staff conversation and activities makes a major contribution to hospital noise [8,9]. Thus a combination of staff conversation, hospital equipment, crying children all add up to the noise levels in the hospital environment.

Noise levels in hospital wards disturb sleep [10]. Infants are reported to have a higher wake-up threshold than adults and noise levels of 75db(A) was found to disturb sleep in children [2]. The noise levels in the paediatric ward in this study were about this range and this could possibly cause sleep interference in paediatric patients. Bentley et al. [4], reported that they had evidence that nearly all patients who came to hospital for surgery accumulate a considerable sleep deficit which must partly be due to the noisy environment. This emphasizes the need to keep noise levels at a minimum in patient care areas. Noise levels were excessive in service areas such as the kitchen, laundry and boiler room especially in the teaching hospital. Similar areas in the general hospitals were relatively quiet as these services are provided at a minimum level. Yassi et al. [11] recorded noise levels above 90db(A) in housekeeping, laundry and dietetic units of a large health care facility in Canada and reported that 11% of workers in these areas had noise induced hearing loss. Other studies have also reported high noise levels in maintenance areas in hospitals[8]. The use of heavy duty equipment in these service areas is responsible for these noise levels.

Noise in operating theatres has been the subject of several reports on noise in the hospital environment [8,12,13]. In this study, noise levels of 74-89db(A) were recorded in the operating theatre. Noise levels recorded in operating rooms have been reported to interfere with communication [8,12,13]. It can be a source of additional stress in patients who are already in stressful situations from various causes such as trauma, haemorrhage and fear [5]. Another report suggests that it can reduce vigilance and impair concentration among theatre staff and that it produced a deterioration in mental efficiency and short term memory in anaesthetic residents[14].

Nigeria does not have specific noise regulations for hospitals but the US Environmental Protection Agency recommends that noise levels in hospitals should not exceed on the average 45db(A) in the daytime and 35db(A) at night. Noise levels in these 3 hospitals exceed these limits and there is a need to recommend a reduction of noise levels to improve patient comfort and staff efficiency. Noise due to staff conversation can be reduced if attention is drawn to this as an important part of patient care. Other sources of noise are from equipment used in patient care. More care in handling these equipment may lead to a reduction in noise levels. Noise levels in service areas like boiler, laundry and generator rooms need to be monitored closely and workers in those areas may need hearing protection and regular audiometric assessment.

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