REDUCTION OF VIBRATION TRANSMISSION IN INCUBATORS

DESCRIPTION OF THE TECHNOLOGY

Neonatal nurseries often suffer from excessive noise pollution. Noise pollution encompasses two concepts, noise and vibration. The latter can be transmitted into the incubators of admitted neonates and the main source, although not the only one, is the motor of the incubator equipment itself.

The usual equipment of a room includes alarms, pulse oximeters, infusion pumps, etc., and has not been designed with the environmental comfort of patients in mind, nor has the room environment, such as central air conditioning. The geometrical shape of the incubator closure and the mechanism for attaching this type of alarm to the incubators, as well as the design of the motor and the motor's mounting, can amplify certain frequencies of airborne noise and vibrations.

According to studies carried out in situ, these levels may exceed the levels indicated in the international standard ISO 2631-2: 2003 and the different national regulations in force in each country. In the case of Spain it is the Royal Decree 1367/2007, which establishes the acoustic quality objectives for noise and vibration in the interior space of buildings for housing, residential, hospital, educational or cultural uses.

Research staff from the Universitat Politècnica de València and the Foundation for the Promotion of Health and Biomedical Research of the Valencian Community FISABIO has developed a methodology to measure the vibrations transmitted to newborns inside incubators to propose the most appropriate solutions.

The methodology takes into account the sources of vibration, spatial conditions of the rooms, the complete design of the neonatal incubator, the position of the incubator motor and the position of the neonatal patient during admission.

MARKET APPLICATION SECTORS

Hospitals with neonatal nurseries that want to reduce vibration transmission to patients.
Incubator manufacturers who wish to study the vibration transmission of their equipment and improve it.

TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

For Hospitals:

- The research team can perform a measurement adapted to each neonatal nursery and each model of incubator, to detect the level and the most problematic points in terms of vibration transmission.
- The research team, in view of the results, will propose the simplest and most economical solutions for the particular case. The solutions will reduce the vibration transmission below the thresholds set by the regulations in force.

For incubator manufacturers:

- The research team can perform a measurement adapted to each newborn nursery and each incubator model, to detect the level and the most problematic points in terms of vibration transmission.
- In the case of incubators with vibration transmission control systems. The research team can validate the product in a real environment. And, if necessary, propose improvement solutions.

CURRENT STATE OF DEVELOPMENT

The methodology has been studied and implemented in the neonatal ward of the Francesc de Borja Hospital in Gandia, inside the incubators that could affect admitted neonates. For this purpose, vibrations that are transmitted inside the incubator and can reach the resting area of the neonatal head have been recorded, distributed in different points, scenarios, days and time slots.

REDUCTION OF VIBRATION TRANSMISSION IN INCUBATORS

INTELLECTUAL PROPERTY RIGHTS

Proprietary Know-How.

COLLABORATION SOUGHT

Companies interested in validating their incubator against vibration or improving, in terms of vibration transmission, the equipment they already have in place.

Hospitals with nurseries that want to reduce the vibration transmission of the equipment they already have in their facilities.

RELATED IMAGES

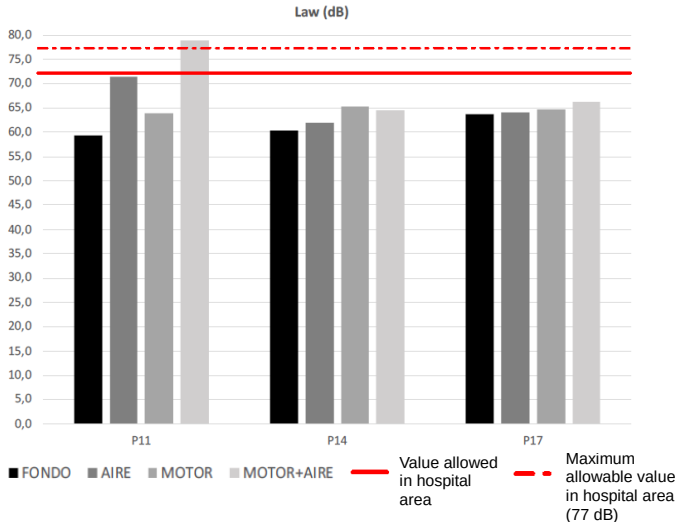

Figure 1: The figure shows the comparative vibration indexes, a detailed parameter that allows us to know if the legislated values for vibration levels are complied with in different uses of buildings, in this case, in hospital use. It can be seen that at point 11, above the incubator engine drawer, and in the scenario of air conditioning running and incubator engine running, the maximum permissible values are exceeded (77 dB) and that, with the air conditioning running in the room, it is very close to reaching the permissible value (72 dB). It is important to point out that these limit values are legislated for buildings, and that it is necessary to be much more restrictive in the case of vibrations on neonates".

Figure 2: Example of vibration recording with accelerometer in the neonatal nursery.

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