european standards of care for newborn health

Topic Expert Group: **Infant- and family-centred developmental care**

Management of the acoustic environment

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Target group
Infants, parents, and families

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
A managed acoustic environment reduces stress and discomfort for infants.

Rationale
A managed acoustic environment supports the infant's comfort and development, and improves satisfaction for parents and healthcare professionals. Before birth, the fetus is exposed to low frequency sounds which are organised and predictable maternal vocalisations, with low exposure to noise. Following birth, the newborn infant is exposed to a wide spectrum of sounds from the environment and human attendants, and relatively low exposure to maternal voice. (1) Environmental noise may comprise loud transients against a high level of background noise (above the hourly Leq 45 dBA threshold (2), which may be associated with discomfort and adversely affect development. (3–5)

Very preterm infants react to sound peaks that are 5-15 dBA above the background noise (6) and which may negatively impact their sleep. (7) Sleep is an important contributor to brain development during early infancy (8) and sleep deprivation in a poorly managed acoustic environment may have a negative long term impact on cognitive, psychomotor and behavioural development. (9) In contrast, low exposure to human or maternal voices may have a negative impact on language development. (10) Using behavioural strategies to alter the NICU environment can thus improve the comfort of the infant, sleep organisation and improve long term development. (11,12) A noisy environment may be a barrier for prolonged parental presence in the NICU (11,12) and for healthcare professionals may interfere with the quality of communication and job performance. (13)

Benefits

Short-term benefits
- Improved comfort and sleep for infants (11–14)
- More attractive environment for prolonged presence for parents (11,12)
- More attractive working environment for healthcare professionals (15)

Long-term benefits
- Improved language development (10,16)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents and family are informed by healthcare professionals about the need of managed acoustic environment to reduce stress and discomfort for infants. (17)	A (Moderate quality) B (High quality)	Patient information sheet
2. Parents are encouraged to request reduction of environmental noise and loud talking near their infant.	B (Moderate quality)	Parent feedback
3. Parents and family are encouraged to talk and sing to their infant adjusted to the infant's cues. (16,18)	A (Moderate quality)	Parent feedback
For healthcare professionals		
4. A unit guideline for managing and monitoring the acoustic environment is adhered to by all staff.	B (High quality)	Guideline
5. Training on acoustic expectation for the infant and on acoustic environment is attended by all staff.	B (High quality)	Training documentation
For neonatal unit		
6. A unit guideline for managing and monitoring the acoustic environment is available and regularly updated. (3–5)	A (Moderate quality) B (High quality)	Guideline
7. A culture for minimising noise and avoidance of loud and unnecessary talking by staff is established.	B (Moderate quality)	Parent feedback, staff feedback
8. A quiet hour is implemented. (13,19)	A (High quality)	Audit report, parent feedback
9. Equipment alarm sounds are decreased. (4)	A (Moderate quality)	Guideline
10. The acoustic environment is evaluated regularly to create awareness and facilitate changes.	B (Moderate quality)	Audit report
For hospital		
11. Training on acoustic expectation for the infant and on acoustic environment is ensured. (4,17,20)	A (Moderate quality) B (High quality)	Training documentation

12. Acoustic criteria are used to select new material, medical device, and equipment.	B (Moderate quality)	Guideline
For health service		
13. A national guideline for managing and monitoring the acoustic environment is available and regularly updated.	B (High quality)	Guideline
14. National and European regulations take into account the combined effect on the acoustic environment from all the medical equipment used by the patient.	B (High quality)	Guideline

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
• Monitor sound levels continuously within the scope of a quality improvement process.	B (Low quality)
For hospital	
N/A	
For health service	
• Train and educate on sensory expectations of infants in relevant curricula.	B (Low quality)

Getting started

Initial steps
For parents and family
• Parents and family are verbally informed and advised by healthcare professionals about how to speak, to sing and to read in a quiet voice to their infant when awake.
For healthcare professionals
• Attend training on acoustic expectation for the infant and on acoustic environment. • Reflect (as individual and as a team) on possible sources of noise and how to reduce noise. • At the bedside, try to avoid any activities other than direct care.
For neonatal unit
• Develop and implement a unit guideline for managing and monitoring the acoustic environment. • Develop information material on the acoustic environment for parents.

- Measure the environmental noise level in different places in the unit and close to the newborn infant to evaluate the acoustic environment.
- Establish a quiet hour.

For hospital

- Support healthcare professionals to participate in trainings on acoustic expectation for the infant and on acoustic environment standard.
- Use sound-absorbing materials for renovating or building NICUs.

For health service

- Develop and implement a national guideline for managing and monitoring the acoustic environment.

Description

The impact of sound reduction on short term medical outcomes, on sleep patterns at three months of age, on staff performance and on parents' satisfaction with the care needs to be evaluated in large and well-designed trials. (21) However, such trials are difficult to conduct for practical and ethical reasons. Thus, recommendations are based on the precautionary principle, as is common in environmental science. (22) The US standards on NICU design (3) recommend that in newborn infant rooms, the sound level shall not exceed an hourly equivalent sound level (Leq) of 45 dBA, sounds should not exceed 50 dBA more than 10% of the time (L10) with transient maximum sounds (Lmax) below 65 dBA. In staff work areas and family areas, and staff lounge areas, the sound level should not exceed an hourly Leq of 50 dB, an hourly L10 of 55 dB, or with transient sounds (Lmax) not over 70 dB.

Strategies to reach these recommended levels have not been studied in depth. Using high-performance sound-absorbing materials to build or renovate the NICU has been suggested (23,24) (see TEG NICU design). Single rooms seem to be quieter than open-bay rooms except for respiratory support equipment. (17,25) The continuous use of sound-monitoring equipment leads to reduction in the sound level for 2 months, but not longer. (5) Changing the behaviour of staff members and the culture of the NICU team is complex. Implementing a “quiet hour” could be a feasible first step. (13) Developmental care training could have an impact on the NICU environment.

Providing an adequate acoustic environment to hospitalised newborn infants is not only based on protecting them from the deleterious effect of noise but also to offer them a nurturing environment enabling the access to biologically meaningful sensory stimuli. (see TEG Infant- and family-centred developmental care)

Source

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