

Good acoustics reduce  
**the need for medication**



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SAINT-GOBAIN

A SOUND EFFECT ON PEOPLE



## The sickest suffer the most

*In a study of chest pain patients at the intensive coronary heart unit at Huddinge University Hospital, Sweden, researchers found that a good sound environment reduces patients' pulses, hospital readmissions and the need for extra medication.*

Some of us have been a patient in a hospital. Most of us are related to someone who has been a patient in a hospital. However – all of us have been affected by sound. Sometimes we are aware of it, and sometimes we suffer without knowing it.

This study shows how different sound environments affect the patients. It shows that everybody suffers in a poor environment, and also that the sickest patients suffer the most. These results reveal the importance of considering good room acoustics when building healthcare facilities.

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## The study

The physical environment in the critical care unit (CCU) was changed in two stages. First to have a poor acoustic ceiling and then to have a good acoustic ceiling.

### Poor acoustics

The original ceiling was converted into a plasterboard ceiling, suspended in a grid system. This ceiling corresponds to an absorption class C ceiling. The ceiling was in place for four weeks.

### Good acoustics

The ceiling was changed to a sound-absorbing ceiling that corresponds to an absorption class A ceiling. It also fulfilled all hygiene demands of the CCU. This ceiling was also in place for four weeks.

### Included patients

A total of 94 patients admitted for evaluation of chest pain were included in the study. Patient groups were recruited during both poor and good acoustics. The patients were:

- Monitored in regard to blood pressure, including pulse amplitude
- Asked to answer a questionnaire regarding the quality of care
- Participating in a follow-up after one and three months, regarding hospital readmissions

### Significantly lower pulses

The study showed that the sickest patients were more vulnerable to noise and poor acoustics than the patients who were not in the same severe condition. Patients with a stable angina pectoris (stable chest pain) didn't show any real change in pulse. In comparison the two critical groups showed a decrease of more than 20% in the good acoustics condition, meaning they were less stressed and more relaxed.

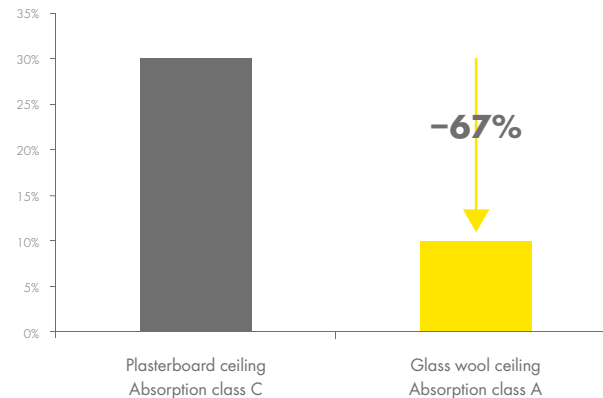
### Pulse amplitude (mm Hg)

	Poor acoustics	Good acoustics	Difference
Unstable angina pectoris	78	59	-24%
Acute myocardial infarction (stroke, heart attack)	62	49	-21%

### Less medication needed

The medication intake in the two acoustic conditions varied significantly. Nearly all the patients were on peroral beta-blockers (normal heart medicine), with extra intravenous treatment given mostly when patients indicated that they were in pain. The need for extra intravenous beta-blockers was 67% lower in the good sound environment.

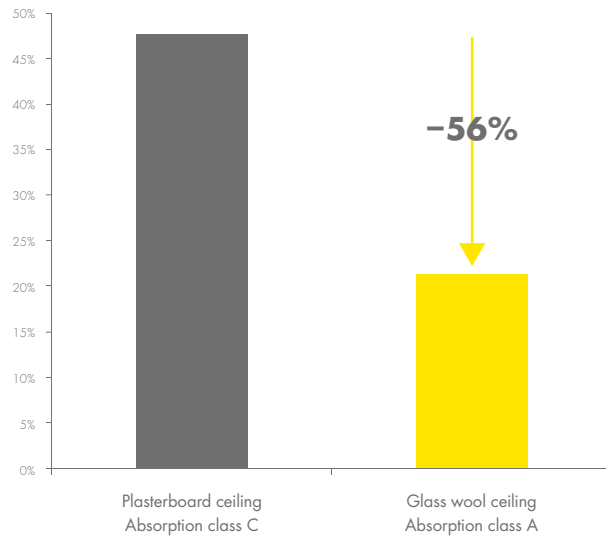
### Percent of patients needing extra intravenous beta-blockers



### Fewer patients readmitted

Another striking result was that fewer patients from the good sound environment were readmitted to the hospital after one and three months respectively. Furthermore, patients in the good acoustic period found the staff attitude to be much better than patients during the period of poor acoustics.

### Hospital readmissions after three months



“ Accordingly, the staff felt fewer demands and less irritation during the good acoustics period ”

### Acoustic measurements in patient rooms

The results showed dramatic improvements between the poor and good acoustic environments. The sound pressure level dropped 5–6 dB in the patient rooms at the same time as the reverberation time dropped from 0.9 sec. to 0.4 sec. Speech transmission index went from 0.64 to 0.86.

#### Acoustic descriptors

Parameter	Measure	Explanation
Reverberation Time	$T_{20}$ (s)	Measures how fast the sound energy disappears in the space. A shorter reverberation time means the space has less disturbing echoes and feels more calm.
Speech Transmission Index	STI/Index 0-1	Measures quality of speech transfer from speaker to listener. If the value increases, speech transmission is improved.



Photographer: Hans Georg Esch

### The Ecophon solution

In healthcare facilities it is important that the solution not only solves the acoustics. It also needs to meet the strongest hygiene demands in regards to cleaning and disinfection. In this study Ecophon provided the CCU with Ecophon Hygiene Performance™ A, a 40 mm sound-absorbing wall-to-wall ceiling in a suspended grid system.

### References

Hagerman et al: “Influence of intensive coronary care acoustics on the quality of care and physiological state of patients”, *International Journal of Cardiology*, Volume 98, Issue 2, February 2005



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Ecophon is the leading supplier of acoustic solutions. We contribute to healthier indoor environments, improving quality of life, wellbeing and working performance. As evolution has adapted the human senses to a life outdoors, our focus is to bring the ideal acoustic environments of nature into our modern indoor spaces. We know they will have a sound effect on people.



The principles guiding our work are grounded in our Swedish heritage, where a human approach and a common responsibility for people's lives and future challenges come naturally.

Ecophon is part of the Saint-Gobain Group, a world leader in sustainable habitat solutions. This is also one of the top 100 industrial groups in the world, constantly innovating to make living spaces more comfortable and cost-efficient. Saint-Gobain offer solutions to the major challenges of energy efficiency and environmental protection. No matter what new needs emerge in the habitat and construction markets, the future is made of Saint-Gobain.



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