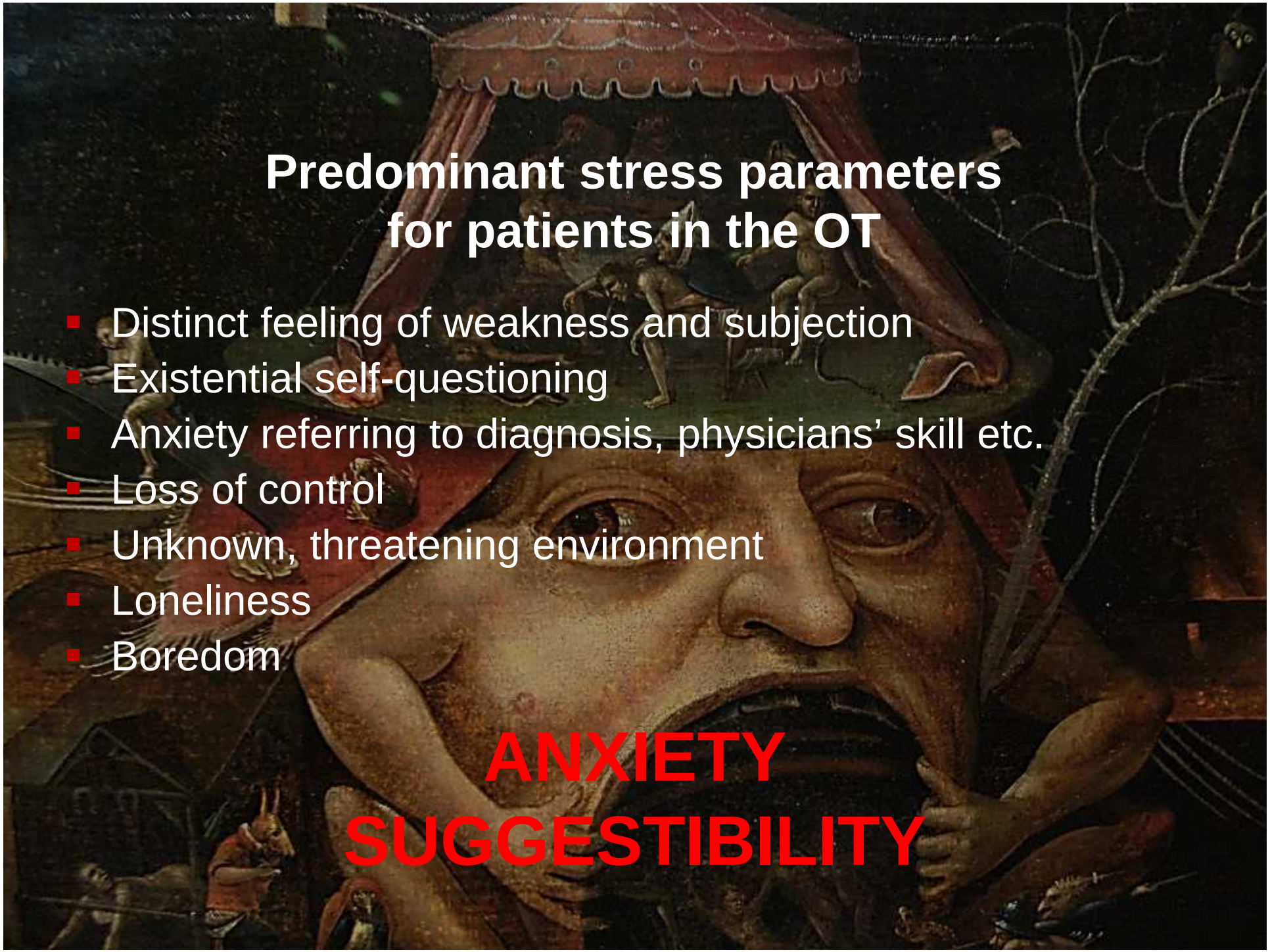
Acoustics - a Major Quality Parameter in Medical Interventions

Holger Sauer
Department of Anesthesiology &
Institute of Medical Psychophysics
Klinikum Westfalen, Dortmund, Germany
i-mpp.de i-mpp.com
holger.sauer@klinikum-westfalen.de



Predominant stress parameters for patients in the OT

- Distinct feeling of weakness and subjection
- Existential self-questioning
- Anxiety referring to diagnosis, physicians' skill etc.
- Loss of control
- Unknown, threatening environment
- Loneliness
- Boredom

ANXIETY
SUGGESTIBILITY

Journal of Geriatric Cardiology
Home | About | Instructions | Submission | Editorial Board | Search

J Geriatr Cardiol. 2012 Jun; 9(2): 197–208.
doi: 10.3724/SP.J.1263.2011.12221
PMCID: PMC3418911

Depression, anxiety, and cardiac morbidity outcomes after coronary artery bypass surgery: a contemporary and practical review

Phillip J Tully[1,2,3,4] and Robert A Baker[1]

Author information ► Article notes ► Copyright and License information ►

Anxiety and stress have a widely underestimated influence on shortterm and longterm outcome

Abstract

Go to:

Research to date indicates that the number of coronary artery bypass graft (CABG) surgery patients affected by depression (i.e., major, minor, dysthymia) approximates between 30% and 40% of all cases. A longstanding empirical interest on psychosocial factors in CABG surgery patients highlights an association with increased risk of morbidity in the short and longer term. Recent evidence suggests that both depression and anxiety increase the risk for mortality and morbidity after CABG surgery independent of medical factors, although the behavioral and biological mechanisms are poorly understood. Though neither depression nor anxiety seem to markedly affect neuropsychological dysfunction, depression confers a risk for incident delirium. Following a comprehensive overview of recent literature, practical advice is described for clinicians taking into consideration possible screening aids to improve recognition of anxiety and depression among CABG surgery patients. An overview of contemporary interventions and randomized, controlled trials are described, along with suggestions for future CABG surgery research.

Medical interventions mean stress - physical AND psychological (for patients and staff)!

- Medical procedures provoke anxiety and stress!
- Stress is – at least partially – “homemade“ and avoidable!

- Stress impairs cognitive processes!

- Health care sector: Highest sickness absence rate (statutory health insurance)

institut arbeitsmedizin & sozialmedizin

chs centre for health & society

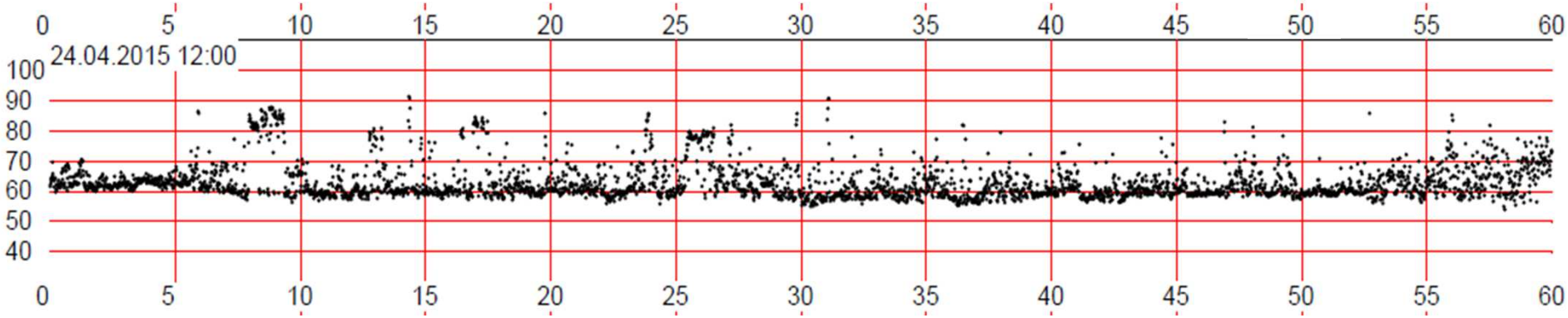
HEINRICH HEINE UNIVERSITÄT DÜSSELDORF

Total Knee Replacement

Incision

Closure

Post-Processing



Notbohm G*, Siegmann S*, Anduleit N*, Sauer H‡ (2015)
*Institut für Arbeits- und Sozialmedizin, Heinrich-Heine-Universität Düsseldorf
‡Institut für Medizinische Psychophysik, Klinikum Westfalen, Dortmund


Individual noise shielding
Positive auditive stimuli

Phonograph in Operating-Room

To the Editor:—For some time I have been employing a phonograph in my operating-room as a means of calming and distracting my patients from the horror of the situation when going under the anesthetic and during operations performed partially or entirely with local anesthesia. The phonograph talks, sings or plays on, no matter how anxious, busy or abstracted the surgeon, anesthetist and assistants may be, and fills the ears of the perturbed patient with agreeable sounds and his mind with other thoughts than that of his present danger. Too often when told to keep up an agreeable conversation with our patients operated on under "local," the assistants merely ask again and again if the sufferer is being hurt or if he feels ary pain, thus only adding to the self-consciousness of the patient, and, after weather commonplaces are exhausted, it seems impossible to find a topic for conversation of any sort, and dead silence ensues. It is not uncommon for nervous patients to beg to have the phonograph continue, should it run down, and many of them converse animatedly with the anesthetist on the subject of the pieces being played throughout the entire operation.

I owe to Dr. Burdick, our anesthetist, thanks for his selection of records admirably adapted to the tastes and temperament of the subjects.

EVAN O'NEILL KANE, M.D., Kane, Pa.
Surgeon, Kane Summit Hospital.

and does any pharm
Freiburg clinic in Ge
Magazine?

What is considere
the use of chlorofo

To the Editor:—
anesthesia among o

ANSWER.—Asid
many letters re
extremely unfort
McClure's, the ef
medical science
have published s
without due consi
seem that the edi
a scientific subje
tant subject as th
authority as to th
this article woul
gesia was someth
of course know th
tion of scopolami
years ago, and w
in Germany. Wh
practically discar

Another natura
would be negligen
scopolamin-morph
that this method

TAG Music , Surgeons , surgery , Operating Room

Here's Why Your Surgeon Listens to Music While You Go Under the Knife

By **Aaron Mamiit**, Tech Times | December 12, 9:52 AM

Playing music in the operating room may not only be beneficial to the surgeon but also to the patient, as long as the song being played is not Queen's "Another One Bites the Dust."
(Photo : Zdenko Zivkovic)

Many surgeons believe that music should be played while in the operating room, with classical music being the most widely listened to.

The popularity and benefits of music in the operating room was discussed by David Bosanquet and his co-authors in the *British Medical Journal*, where he is an editorial author. Bosanquet is also a surgical registrar in the University Hospital of Wales department of surgery.

Bosanquet wrote that music is played in the background for 62 to 72 percent of operations, and it is the lead surgeon that often chooses the song.

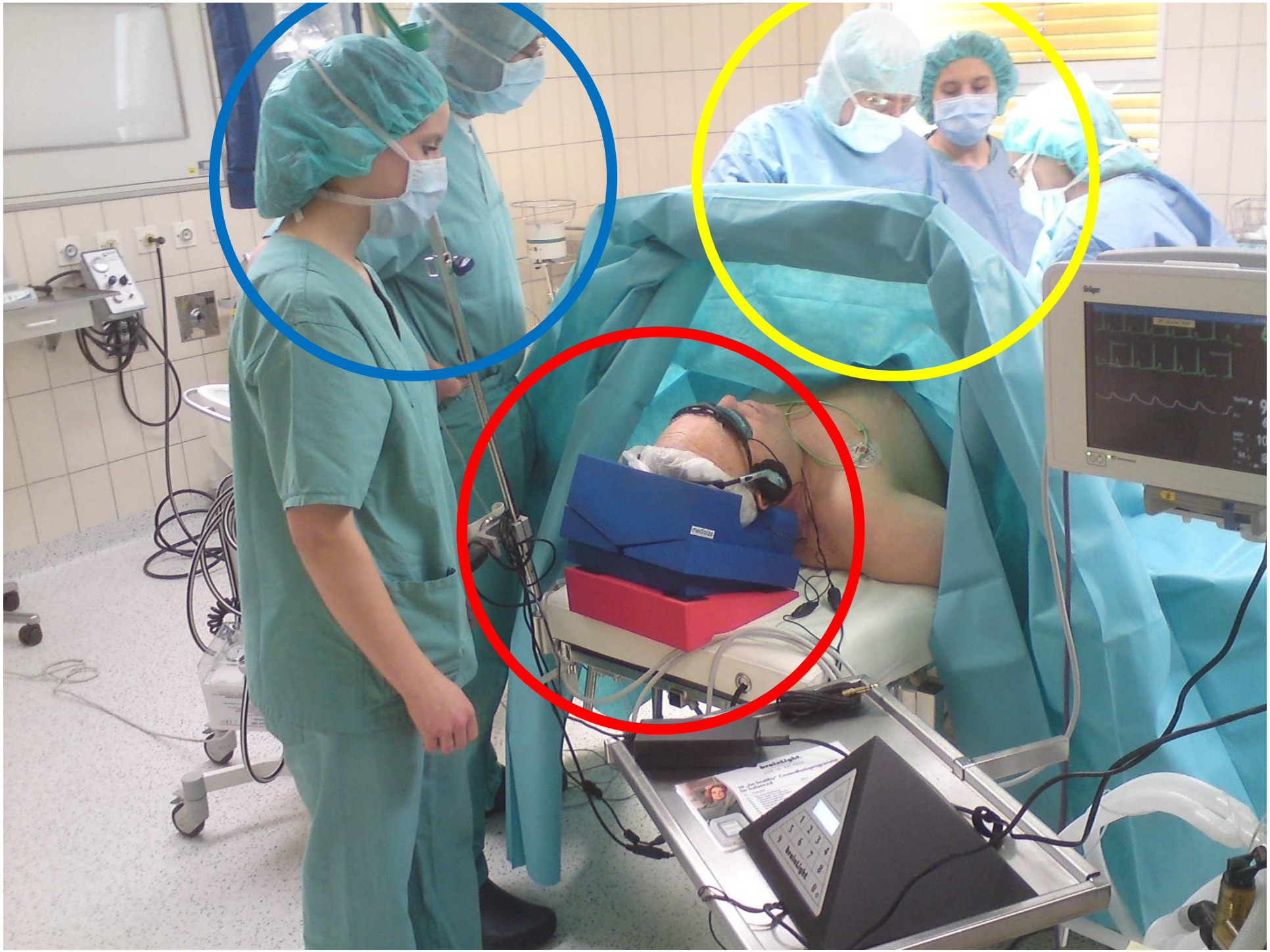
The reason for music in the operating room is the supposed effect of reducing anxiety, and because it improves the efficiency and communication of team members. Bosanquet adds that surgical performance also appears to be enhanced with music because focus on the task is increased, especially for the surgeons that regularly listen to music.

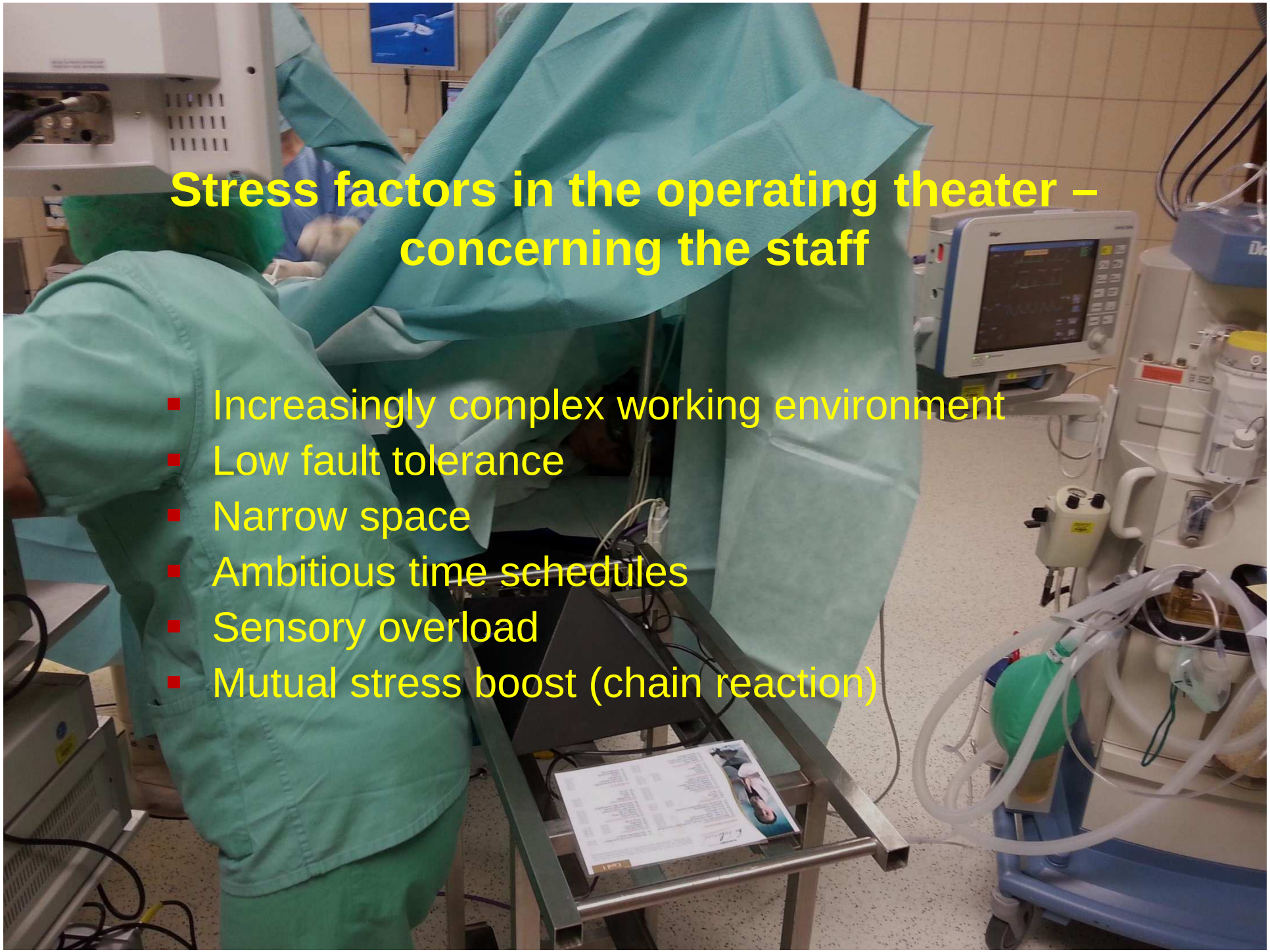
Classical music is the most popular genre in the operating room because, according to Bosanquet, it is able to "evoke mental vigilance," aided by the fact that there are no lyrics.

Most Popular Most Commented Must Rea

10 MAY '15
Samsung Galaxy Note Android 5.0 Lollipop Update Release Roundup: Note 4, Note 3, Note 2 and Note Edge

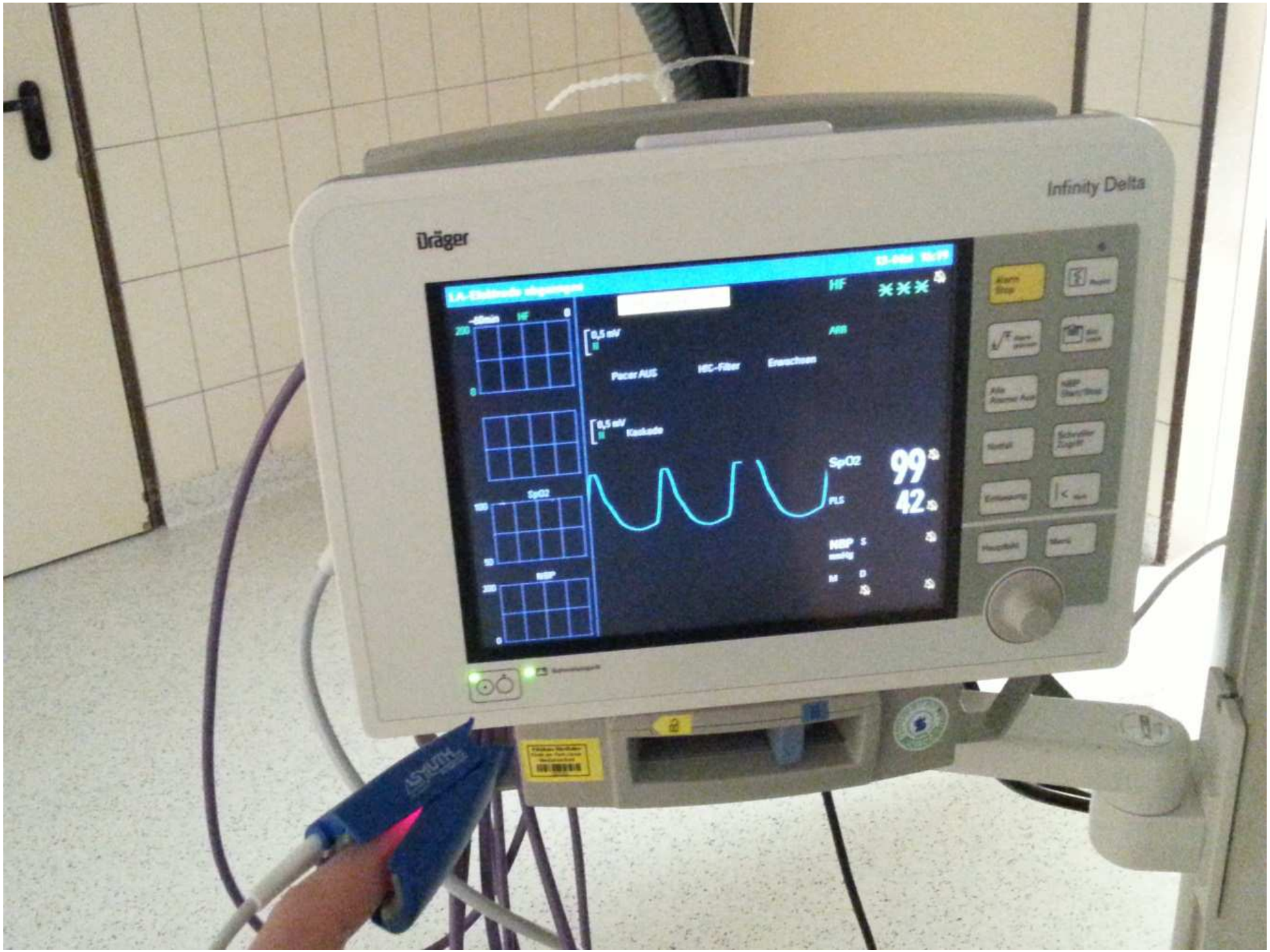
10 MAY '15
More Android 5.0 Lollipop Problems Reported By Users Of Samsung Galaxy S5, S4; Samsung Acknowledges Problem





Stress factors in the operating theater – concerning the staff

- Increasingly complex working environment
- Low fault tolerance
- Narrow space
- Ambitious time schedules
- Sensory overload
- Mutual stress boost (chain reaction)


Dräger
Infinity Delta
HF
Pacer AUS
HIC-Filter
SpO2
99
PLS
42

accidents and patient harm. To help hospitals reduce technology-related risks, ECRI Institute publishes an annual list of Top 10 Health Technology Hazards.

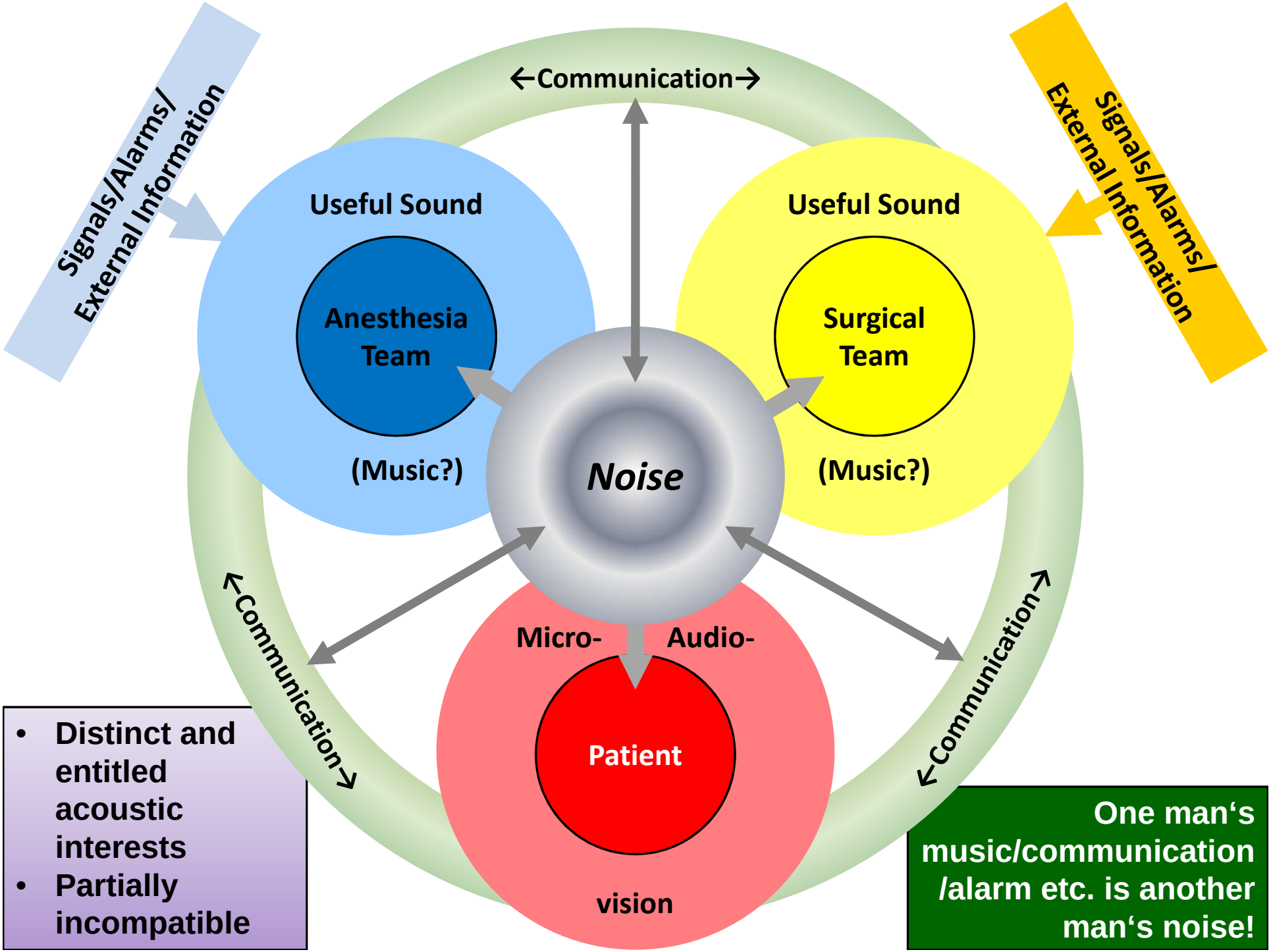
The just-released 2015 hazards list highlights 10 safety topics that ECRI Institute deems crucial for hospitals to address in the coming year.

"Technology safety can often be overlooked," says James P. Keller, Jr., vice president, health technology evaluation and safety, ECRI Institute. "Based on our experience, there are serious safety problems that need to be addressed. ECRI Institute recommends that hospitals use our list as a guide to help prioritize their technology-related safety initiatives."

The **2015 Top 10 Health Technology Hazards** report, available for download as a free public service, details a variety of technology hazards that put patients at risk. Each hazard includes an overview of the issue and recommended action steps to aid healthcare facilities in their efforts to maintain a safe environment for patients and healthcare workers. Topics on the 2015 list include:

1. **Alarm hazards:** Inadequate alarm configuration policies and practices
2. **Data integrity:** Incorrect or missing data in electronic health records and other health IT systems
3. **Mix-up of IV lines** leading to misadministration of drugs and solutions
4. **Inadequate reprocessing** of endoscopes and surgical instruments


ONE MAN‘S MUSIC …
YOKOHAMA
351
reifen-ritter.de
NSU
301
NSU
327
… is another man‘s noise


Signals/Alarms/
External Information
←Communication→
Signals/Alarms/
External Information
Useful Sound
Anesthesia
Team
(Music?)
Useful Sound
Surgical
Team
(Music?)
Noise
←Communication→
←Communication→
Micro-
Audio-
Patient
vision
• Distinct and entitled acoustic interests
• Partially incompatible
One man‘s music/communication /alarm etc. is another man‘s noise!

CELEBRATE THE 65TH ANNIVERSARY OF:

NOISE AND HEALTH

SPECIAL SESSION IN HONOR OF KARL D. KRYTER

Jointly organized by the Technical Committees on Architectural Acoustics, Noise, Psychological & Physiological Acoustics, Speech Communication, and Signal Processing in Acoustics

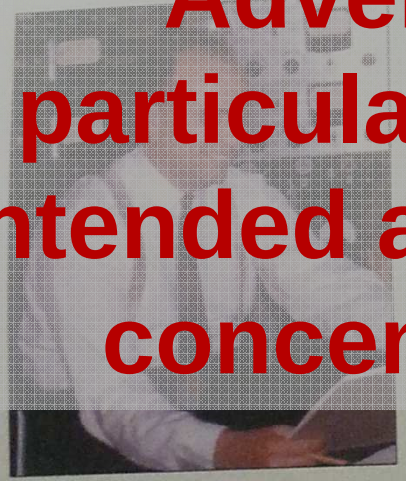
This special session marks the re-emergence in the USA of noise and health as an area of clinical and epidemiological inquiry after thirty years of neglect; the session celebrates the publication, sixty-five years ago, of the first edition of Karl D. Kryter's encyclopedic landmark, The Effects of Noise on Man.

...day, May 19, 2015
8AM – 5:30PM

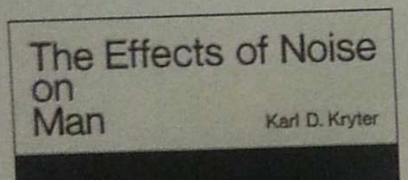
169th Meeting of the
Acoustical Society of America

Wyndham Grand Pittsburgh
Downtown Hotel, Pittsburgh PA

Session 2aAAa–2pAA
Special Session "Kryter I and II"



Karl D. Kryter at BBN (1963);
Photo courtesy Leo Beranek



8:00 *Chair's Introduction* (D. Sykes; W. Bavarian; ...)

8:05 Keynote: Mathias Basner MD; *Auditory and non-auditory effects of noise on health: An ICBEN perspective (2aAAa1)*

8:55 Erick Gallun; *Effects of hospital noise on speech intelligibility (2aAAa3)*

9:15 Karl Pearsons; *A tribute to Karl Kryter (2aAAa4)*

Break 9:55–10:05 AM

10:05 Mary Florentine & Michael Epstein; *Zeitgeist. From Kryter's work at the Psycho-Acoustic Laboratory at Harvard (PAL) to the present*

10:25 Michael Heinz; *Neurophysiological effects of noise ... Extending effects of noise on man? (2aAAa8)*

10:45 Sharon Kujawa; *Noise-induced cochlear synaptopathy. Extending effects of noise on man? (2aAAa9)*

11:05 Larry Humes; *Age-related hearing loss, noise-induced hearing loss, and speech-understanding performance (2aAAa9)*

11:25 Peter Dodds; Ning Xiang; David Sykes; Wayne Triner DO; Linda Sinclair; *The effects of noise on physician cognitive performance in a hospital emergency department (2aAAa10)*

11:40 Panel Discussion and Open Microphone

Lunch break 12 Noon–1PM

1PM Perspectives from Noise, Speech Communication and Signal Processing (2pAA)

1:00 *Chair's Introduction* (K.Van Wyk; L. Humes)

1:05 **Keynote:** Wolfgang Babisch; *The cardiovascular effects of noise on man (2pAA1)*

1:35 Paul Barach MD; *The behavioral impacts and spatial dynamics of alarm fatigue in reverberant healthcare treatment spaces (2pAA2)*

"Adverse health effects occur, in particular, when noise interferes with intended activities (e.g. communication, concentration, relaxation, sleep)"

Ann Surg. 2014 May;259(5):1025-33. doi: 10.1097/SLA.0000000000000253.

A noise-reduction program in a pediatric operation theatre is associated with surgeon's benefits and a reduced rate of complications: a prospective controlled clinical trial.

Engelmann CR[1], Neis JP, Kirschbaum C, Grote G, Ure BM.

Author information

Abstract

OBJECTIVE: We assessed the impact of a noise-reduction program in a pediatric operating theatre.

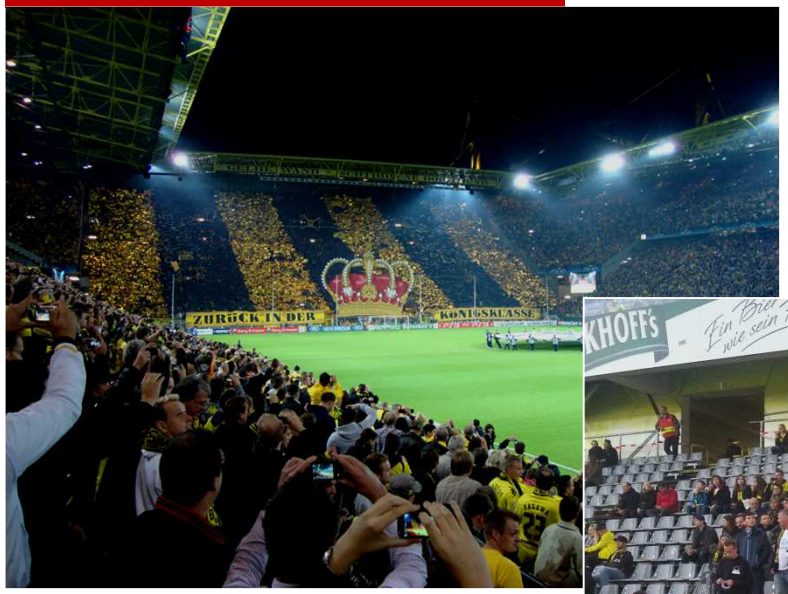
BACKGROUND: Adverse effects from noise pollution in theatres have been demonstrated.

METHODS: In 156 operations spatially resolved, sound levels were measured before and after a noise-reduction program on the basis of education, rules, and technical devices (Sound Ear). Surgical complications were recorded. The surgeon's biometric (saliva cortisol, electrodermal activity) and behavioral stress responses (questionnaires) were measured and correlated with mission protocols and individual noise sensitivity.

RESULTS: Median noise levels in the control group versus the interventional group were reduced by -3 ± 3 dB(A) (63 vs 59 dB(A), $P < 0.001$) with a grossly decreased number of peaks greater than 70 dB(A) ($\Delta n = -61$/hour, $P < 0.01$). The intervention significantly reduced non-operation-related noise. The incidence of postoperative complications was significantly lower in patients of the intervention group (n = 10/56 vs 20/58 control; $P < 0.05$). "Responders," surgeons with an above-average noise sensitivity (correlation $r = -0.6$ for the work subscale of the NoiseQ questionnaire, $P < 0.05$), experienced improved intrateam communication, a decrease in disturbing conversations and sudden noise peaks ($P < 0.05$). Biometrically, the intervention decreased both the surgeon's pre- to postoperative rise in cortisol by approximately 20% and the surgeon's electrodermal potentials of greater than 15 µS, indicating severe stress by 60% ($P > 0.05$).

CONCLUSIONS: Spontaneous noise during pediatric operations attains the magnitude of a lawn mower and peaks resemble a passing truck. The sound intensity could be reduced by 50% by specific measures. This reduction was associated with a significantly lowered number of postoperative complications. The surgeon's benefits are idiosyncratic with "responders" experiencing marked improvements.

PMID: 24394594 [PubMed - indexed for MEDLINE]



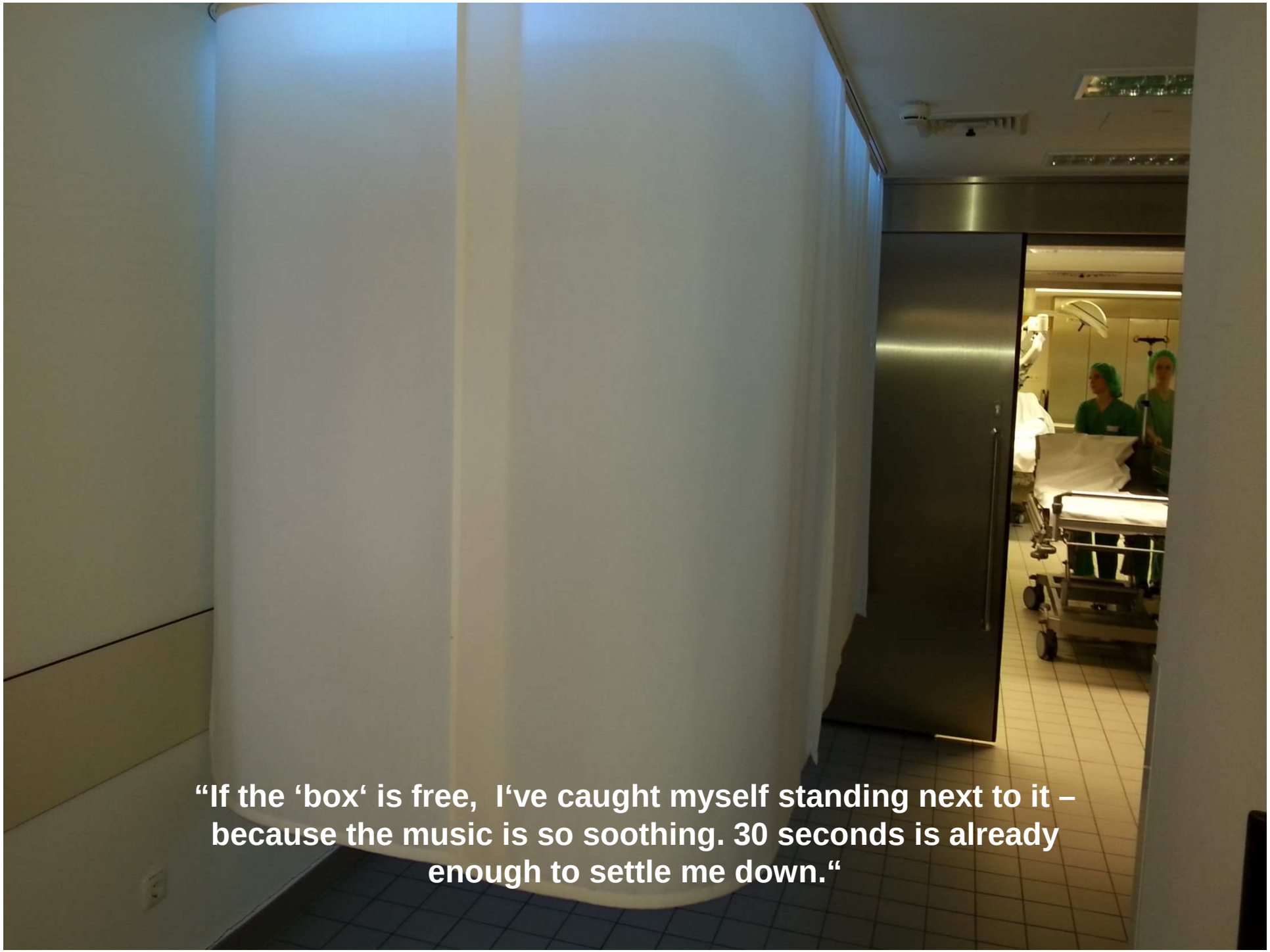
Collective wellbeing

Zoning

Individualization

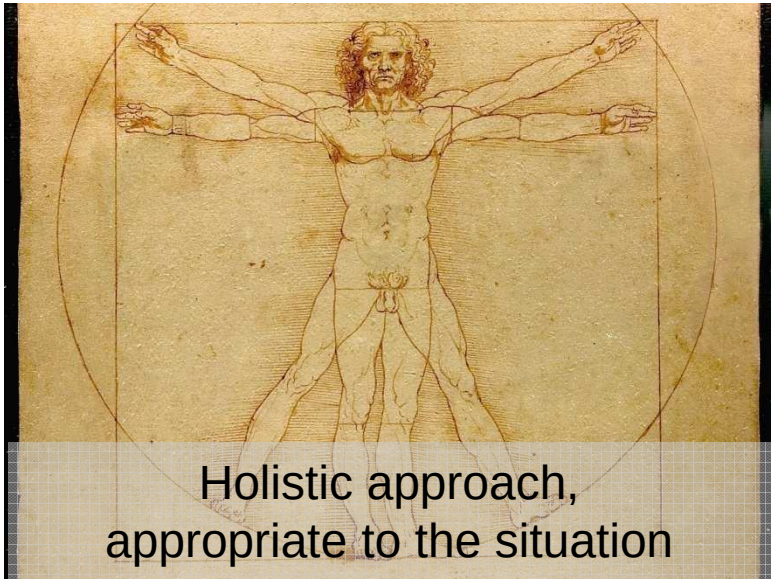
Neurozeptives
Entspannungs- und
Stressreduktionsmodul
(**NEST**)

“Neuroceptive relaxation and stress reduction module”

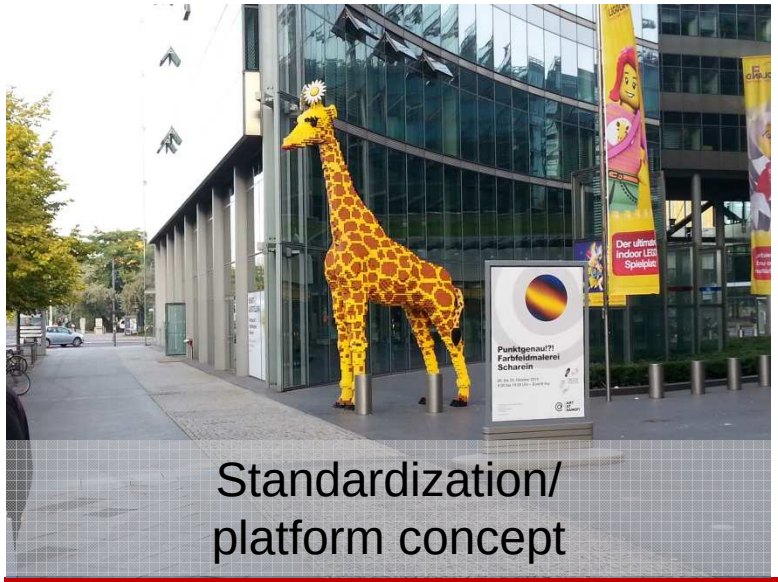

“If the ‘box‘ is free, I‘ve caught myself standing next to it –
because the music is so soothing. 30 seconds is already
enough to settle me down.“

Clear long-term perspectives

LET‘S DO IT!



Holistic approach,
appropriate to the situation



Standardization/
platform concept

Iterative, diligent proceeding
(even short steps are steps!)