Report & Conclusions from:

HPNoSS Symposium & Workshop on Positive Hospital Soundscapes

Background to the project

Hospitals are inherently noisy. This means patients sleep poorly, affecting their experience and recovery, while noise levels also have an impact on staff practices. Yet, despite much research over the past 50 years addressing the problem of 'hospital noise', the recommended maximum sound levels for hospitals continue to be regularly exceeded.

Key Facts
- Compared to 1960, hospital noise levels during the day have increased by 15dB, from 57dB to 72dB; similarly, noise levels at night increased from 42dB to 60dB.
- Since the 1950's, the King's Fund observed that "hospitals are noisier than ever before" and noted how there are "numberless sources of noise and it seems that there can be no cure for all".
- In some hospital areas like the intensive care unit (ICU) sound levels always exceed 45dB and peak at just over 100dB, which is the equivalent of a lawn mower.
- Lack of sleep hinders rest, treatment and recovery of patients; and it has been implicated in the development of delirium, increased pain sensitivity, high blood pressure and poor mental health.

Hospital Project on Noise, Sound and Sleep (HPNoSS) seeks to provide a holistic understanding of sound in the hospital environment and the intimate relationship of noise to sleep, rest, treatment and recovery. HPNoSS is a collaborative project between King's College London's Florence Nightingale Faculty of Nursing, Midwifery & Palliative Care and the University of the Arts London, facilitated by the Cultural Institute at King's.

The HPNoSS approach

The HPNoSS approach seeks to view the hospital soundscape as a malleable component of the healthcare environment, and one that can have positive as well as negative effects. Bringing together academics, clinicians, artists, engineers and service users HPNoSS seeks to raise awareness of the issues around noise among nursing, medical and other hospital staff and explore practical solutions that will contribute to staff and patient wellbeing – and potentially improve recovery times.

As part of a longer-term approach, the first phase of HPNoSS sought to:

I. Pilot data collection techniques, and sound logging of hospital wards;
II. Undertake preliminary analysis of sample data files of hospital noise, exploring the compositional possibilities of hospital sound; and

III.   Organise a one-day workshop through which to run a pilot experiment to test hospital soundscape preference and composition, and create a positive hospital ward soundscape.

The current report presents results and conclusions from the HPNoSS Workshop held on the 14th of September 2017.

The Symposium & Workshop

The HPNoSS Symposium & Workshop was held at the Chantler Simulation and Interactive Learning (SaIL) Centre, at the King's Guys Campus. Using a set of eight speakers on stands (in kind support from the London College of Communication) we recreated a hospital soundscape at the Chantler Simulation Ward, using a recording made at an Intensive Care Unit at Chelsea & Westminster NHS Foundation Trust, through matching sound levels (dB) and subjective response. With the technical support of Sound Directions, a sound masking system was also installed throughout the Chantler Ward using a set of eight speakers elevated at a height (see picture 1).

Picture 1: Speaker installation at Chantler SaIL Centre

The workshop secured the generous in-kind support of the following partners:
- Sound Directions (www.sounddirections.co.uk), provided the sound masking system installed in the simulation ward
- Sleep Phones (www.sleepphones.co.uk), provided sleep friendly headphones tested in the workshop
- BOSE (www.bose.co.uk), provided noise cancelling earphones used in the workshop
- iZotope (www.izotope.com), provided specialist software for sound analysis and playback
- CW+, (www.cwplus.org.uk) the charity for Chelsea & Westminster NHS Foundation Trust facilitated and supported access to the clinical setting

Workshop attendance

The workshop was attended by an interdisciplinary group of stakeholders from a range of backgrounds, all interested in the sound, sleep hospital nexus. Specifically:

- Industry partners & Technical specialists
  - Alex Krasnic, Vanguardia (www.vanguardia.co.uk), also representing the UK Institute of Acoustics (www.ioa.org.uk)
  - Hanieh Motamedian & Stan Boivin-Champeau, Sound Directions (www.sounddirections.co.uk)
  - Momo Hoshijima, Cundal (www.cundall.com)

- Academics & Researchers
  - Daniel YT Fong, University of Hong Kong
  - Julie Darbyshire, University of Oxford
  - Victoria Bates, University of Bristol
  - Andreas Xyrichis & Anne Marie Rafferty, King's College London (HPNoSS)

- Academics & Artists
  - John Wynne & Angus Carlyle, London College of Communication, University of the Arts London (HPNoSS)
  - Antoine Bertin, Studio Time, Brussels & Paris
  - Catherine Lamont-Robinson, University of Bristol

- Service users (patients, relatives)
  - Edward Dowie, Service User & Musician
  - Katie McIntyre, Service User
  - Harry Charalambous, Service User & Physicist

- Clinical partners
  - Beth Willis, Guy's & St Thomas' Hospitals
  - Carolyne Stewart, King's College Hospital & KCL FNFNM
  - Charlie Brown, Chelsea & Westminster Hospital
  - Deborah Dawson, St George's Hospital
  - Nike Tella, Guy's & St Thomas' Hospitals

Workshop structure and content

The HPNoSS Workshop & Symposium consisted of a combination of: i) presentations by expert participants on related research work in the area of hospital noise and sleep; ii) experimenting with sound masking and noise cancelling solutions in the simulation ward; and iii) facilitated group discussions. Specifically:

- Presentations
    - Deborah Dawson – "Towards the acoustical characterisation of an Intensive Care Unit"
    - Julie Darbyshire – "Sleep in the ICU: Lowering elements of noise in the critical care environment"
    - Hanieh Motamedian – "Sound masking and Wellbeing"
    - Daniel YT Fong – "Environmental noise pollution in hospitals in Hong Kong"

- Experiments
    - Testing and comparing the effects of three different sound masking states on participants' perceptions of the hospital soundscape
    - Testing and comparing the effects of noise cancelling earphones, with and without sound masking, on participants' subjective response
    - Testing and comparing the effects of sleep friendly headphones, with and without sound masking, on participants' perceptions

- Group discussions, exploring the following questions
    - How does a hospital soundscape with masking make you feel?
    - What might the advantages and disadvantages of masking provide for patients and for staff?
    - Are headphones an option to improve the experience of the hospital soundscape?
    - Do sound masking and noise cancelling interventions have potential to promote sleep and rest in hospital settings?

Data collection

Both quantitative and qualitative data were collected during the workshop following participant consent. Qualitative data was collected through contemporaneously recorded fieldnotes of observations and audio recording of group discussions later transcribed verbatim.

Quantitative data was collected through a set of project specific questionnaires based on work done by Mackrill et al.[1]. These consisted of both open and closed questions, and captured data on the effects of the various interventions on participants' experiences and perceptions of the hospital soundscape:

- Hospital Soundscape Questionnaire
- Noise Cancelling Earphones Questionnaire
- Sleep Friendly Headphones Questionnaire

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[1] Mackrill et al. (2013) Improving the hospital 'soundscape': a framework to measure individual perceptual response to hospital sounds. Ergonomics (56) 1687-1697.

Qualitative data was analysed through standard social science techniques using a thematic approach. Quantitative data was analysed using a combination of descriptive and inferential non-parametric statistics.

Results

Conclusions from the quantitative and qualitative data analysis align well with discussions that occurred during the workshop about participants' subjective response to the soundscapes and positive reaction to the different interventions. The contribution of different stakeholders to the workshop can be seen in Figure 1.

Figure 1: HPNoSS stakeholders at the workshop
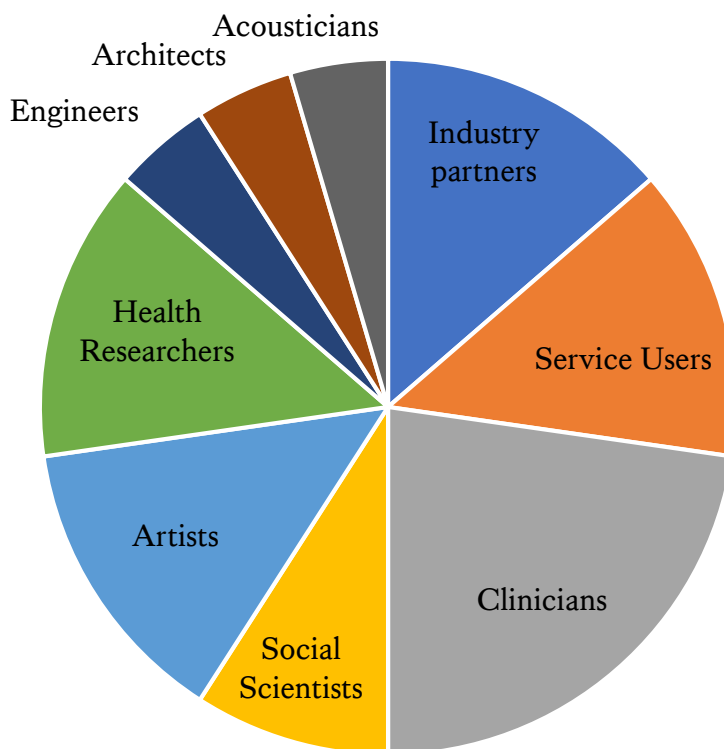
Participants' response to hospital soundscape & sound masking

The framework proposed by Mackrill et al. was used to measure the subjective response to each hospital soundscape intervention; summary scores presented in Table 1. Results show that the scoring of the three different soundscapes was similar across the three experimental conditions, with a notable difference on the relaxation factor between State 1 and State 2 (Figure 2).

State 1, which consisted of sound masking using synthetic sound, was perceived as the most relaxing and also generated the most interest. State 2 was the control state during which sound masking was switched off; this was the least relaxing state, as expected. These results lend weight to our hypothesis that sound masking can have a positive effective on participants' subjective response to the hospital soundscape. The small sample limits the generalisability of these findings, but these promising results suggest a larger study is warranted.

Table 1: Mean scores for each state, across each factors of the emotional dimensions of a hospital soundscape

Condition	State 1		State 2		State 3	
Factor	Relaxation	Interest	Relaxation	Interest	Relaxation	Interest
Mean	3.6	4.3	3.1	4.2	3.3	4.2
Standard Deviation	1.2	1.1	1.1	1.2	1.2	1.5

State 1: Synthetic sounds; State 2: No sound masking; State 3: Natural sounds

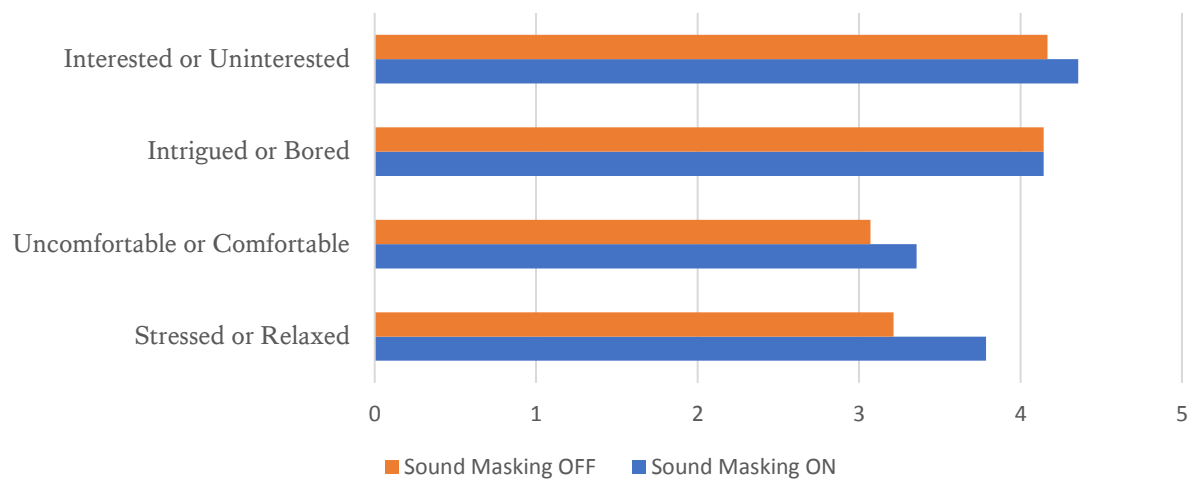Figure 2: Participant reaction to the hospital soundscape, with and without sound masking

Figure 3 below depicts these results on a semantic space. This is useful as it allows a visual representation of the soundscape. It can be seen that Relaxation factor values are near the natural point on the semantic space. Interest and Understanding is positioned towards a more interest end of the scale. This may suggest that participants were curious about the interventions and aware of them, which generated some interest. Whether this led to our results being somewhat skewed would need examining through a more tightly controlled experiment.

Encouragingly the masking interventions scored very closely to the existing hospital soundscape. This shows that they do not have a profoundly negative impact and, on the contrary, offer potential to improve positive perception of the hospital soundscape further.

Figure 3: Participant and group mean scores on the semantic space

Hospital Soundscape Semantic Space
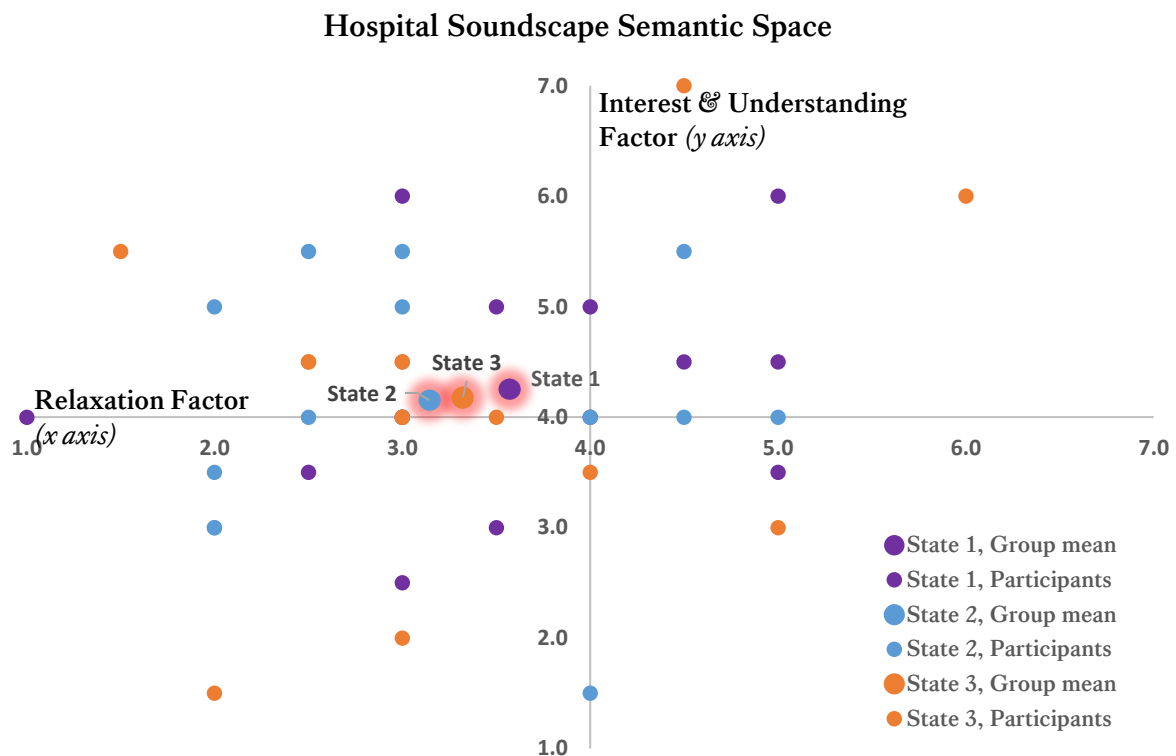
Analysis of the qualitative data generated through participant feedback and group discussions revealed key elements that seemed to make an impact on how participants experience the hospital soundscape. Following standard social science analysis techniques following a thematic approach, participants' perceptions were coded and clustered in three main categories: i) Relaxation & Discomfort; ii) Awareness & Rest; and iii) Sound masking preference & User empowerment. These are discussed in turn below.

i) Relaxation & Discomfort

One of the most dominant discussion points at the workshop was about issues of relaxation, stress, comfort and discomfort in response to the hospital soundscape. Participants agreed that the hospital soundscape reproduced at the workshop was not conducive to relaxation or rest, and certainly not to sleep. As one participant put it:

> "Makes me feel uncomfortable, completely sick inside my stomach. Uneasy, constant background noise of muffled voices. Clanging, like being in an overcrowded room. Different tones, accent, high and low pitch sounds and voices. Just want to get out."

The workshop was not designed to enable participants to explore implications for sleep in a reliable manner. However, many did spontaneously comment on this and noted the negative impact the hospital soundscape would likely have on their ability to sleep. For example, participants noted:

> *"Would be impossible to sleep with this going on all night."*

> *"No let-up in activity -would be impossible to sleep."*

The words discomfort and stress were frequently mentioned in participants written evaluations as well, signifying the negative effect the hospital soundscape can have on participants' experience and emotional wellbeing:

> *"Occurrence of 'high-level' impulsive sounds (metal-on-metal), also punctuated by background talking. I found this soundscape to be stressing and extremely uncomfortable."*

The source of stress and discomfort did not seem to be any one specific kind of sound, but rather the number of different sounds experienced at the same time, which were of various frequencies and decibel levels. Participants' reactions and comments seem to suggest that they struggled to process the acoustic complexity that characterises the hospital soundscape:

> *"Sudden loud noise is frequent and intermittent, which is stressful at times."*

> *"Family talking loudly in distress is clearly audible and is distressing."*

> *"I heard more banging sound (or one of equipment) which made me feel more annoyed and stressed."*

> *"Voices in themselves might not be a problem, but sometimes shouting/loud conversations are. This would make me stressed if I was very ill."*

> *"Quiet' periods are punctuated by high-level impulsive sounds, which are likely to elevate stress and anxiety."*

> *"It's the irregular nature of noise generated by people which is most alarming."*

Sound masking, either as an environmental solution through speakers or individual solution through headphones, was therefore perceived to be very promising. Participants were asked to comment and discuss the different 'states' of the soundscape (i.e. no masking, synthetic sound, natural sound) but were not told explicitly which intervention they were experiencing each time. The majority of participants did experience differences between the three states, with more positive comments given when experiencing sound masking. Some typical comments included:

> *"I genuinely felt much calmer, relaxed and undisturbed by activities surrounding me."*

> *"The noise I could hear clearly before feels less pronounced and therefore less disturbing."*

> *"In terms of when you are trying to relax, I think this will definitely help reduce perceived noise."*

"It took me some time before noticing the added noise. I feel it helps reduce the annoyance of the noise."

"The overall soundscape is also seemingly louder [without masking] or more intrusive - could never sleep in this!"

Participants' reactions to the different sound masking interventions were mixed, with some favouring one state over another. This suggests that individual preference has an important part to play on the perceived effectiveness of sound masking. Preference to either synthetic or masking sound was also explored, and is a theme discussed later in this section.

ii) Awareness & Rest

Another substantial cluster of participant comments was around remaining aware of the environment in which they were in and the implications this had for their ability to relax and to rest. As one of the participants put it:

*"Being able to **tune into reality** is quite important."*

Interestingly, some of the participants' comments here were polarised, with some wanting to be able to clearly understand the activities around them and others finding this added to their discomfort. This preoccupation and anxiety about identifying the sources of the noise in order to tune into reality was evident in some of their comments, such as:

"I feel as if I am behind a curtain and that something is not quite as it should be with either other patients or staff and visitors."

"Not sure where voices are & what is actually happening."

"I am struggling to identify the sounds."

"Need some more awareness of surroundings."

An important dimension of this sense of awareness was about participants' ability to listen to conversations clearly; to be able to understand and follow what was being said. Where the interventions interfered with this, frustrations were raised:

"There is something really difficult when you can hear conversation, but you can't make out what it was. I found that quite frustrating."

"Slightly frustrated as I can hear voices, but cannot make out what is being said. The sound is very conversational so I feel like I should be able to understand what is being said."

Remaining aware and being able to follow conversations was important for some participants since it helped them connect with the environment. This helped create a comforting effect for some, while for others it made the soundscape more interesting and consequently less stressful. Some typical comments were:

"Can't hear details of conversations. Therefore feel somewhat isolated from environment."

"The greater prominence of other patients' voices provides some point of 'human' interest."

"I feel more interested as I can hear more clearly of the conversation."

"Almost less stressful being able to overhear actual conversations - more interesting therefore less stressful."

However, participants also commented that one of the implications of being able to follow conversations clearer is hindering their ability to sleep:

"Can hear more of the conversation + speech is clearer. Not sure this is better! Still can't quit follow what's going on so need more mental energy to concentrate."

"I feel more interested as I can hear more clearly of the conversation. However, if I want to sleep, I would feel more annoyed and more stressful."

Participants' comments therefore implied that being able to tune in and out of conversations at will, depending on whether they wanted to sleep or not, would be a desirable feature of future interventions. While listening in to others' conversations could be considered by some as compromising privacy, this issue did not come up in any of the participants' accounts.

iii) Sound masking preference & User empowerment

The final cluster of participant comments centred on their preferences concerning the different masking sounds used, which were linked with their wish for greater user control over the soundscape and choice of masking sound. Some participants felt the effect of sound masking more strongly than others and commented how they disliked the 'added' noise:

"I think the constant noise - unchanging - would drive me crazy quite quickly!"

"It just felt like there was yet another sound in the room, and another thing to try and ignore."

"There seems to be an added constant sound kind of like a whirring. It's out of place and I am focusing on that."

One of the principles of effective sound masking is that the added sound should be more subtle than obvious, which was for some but not other participants. This may be the result of a combination of factors such as the temporary nature of the sound masking installation and the limited time available prior to the workshop to fully analyse the acoustics of the simulated ward to adjust the sound files accordingly. Most significantly, the workshop invited participants to focus on hospital sound and inevitably made them more aware of the soundscape than they would normally be. Future research into sound masking should take this into account and allow for a sufficient habituation period before examining potential effects.

The workshop also provided an opportunity for participants to experience sound masking using natural sound files. Participants' reactions to the natural sounds was very positive, exemplified by the below spontaneous conversation among participants:

> *"- I quite liked the sec – the water one. I liked that.*
> *- Me too. I love the sound of the rain. That was my highlight.*
> *- I think it's really nice… to go to sleep to.*
> *- …the best thing.*
> *- It's quite peaceful.*
> *- I love it when it's raining outside."*

The participants responded positively to natural sounds both when listened to via headphones and via the speaker system, which they found especially pleasing. The addition of the natural sound had a profound effect on some participants who experienced a positive change in how they perceived the hospital soundscape:

> *"I could no longer hear the activity noise in the background as adverse noise. Some of the background noise even became pleasant. e.g. I thought the oxygen pump was crickets singing. I really liked it."* [experienced via headphones]

> *"I felt more comfortable in this one- I even nodded off once! I found it more difficult to concentrate on its sound."* [experienced via speakers]

One of the natural sounds in particular, the sound of rain, received very positive praise with participants noting that it helped them relax and could see its potential in helping them sleep. For example:

> *"The raindrops sound is very soothing and relaxing."*

> *"I can hear the rain very clearly- very relaxing!"*

> *"I loved the sound of rain in my ears."*

> *"I would enjoy having access to this sound, it is evocative and gentle and I would imagine help me to drop off to sleep sooner."*

However, not all participants had a similar positive reaction to the other natural masking sound used, which included bird sounds. Some participants felt confused by the sound of birds and did not feel it a good match to the hospital soundscape:

> *"The addition of natural sounds (e.g. bird-song) has not made the background noise any less disturbing. It just appears that the background noise is happening externally (e.g. a park) rather than inside a building."*

> *"The bird sound does not sound fit in the environment. I have a weird feeling of hearing bird sound in the ward."*

The above lends further weight to the argument that individual preference plays an important role in how people can experience sound masking, especially when using natural sounds. This suggests more work should be done to explore reactions to different kinds of sounds, as well as optimal ways of combining synthetic with natural sounds for a more balanced effect.

Finally, the participants at the workshop raised issues around user control and potential for patient empowerment. The subjective nature of noise and how people experience sound was prevalent in discussions and participants' feedback:

> "And I think it's something that potentially you would, you know, you'd need a lot of options, so that people could, you know, potentially flick through and choose **their version of quiet.**"

Participants wished for a future solution that would allow people to have:

> "…a variety of options that might work for different people, but also the same person at different times, depending on what state they're in, so, you know, how aware you are and how not aware."

The hospital experience for patients and relatives can often be disempowering, since there is little in the hospital environment they can control for themselves. The potential for a responsive and modifiable system, which can adapt to different situations, times of day or indeed patient preferences was therefore high on participants' wish list.

Headphone perceptions & preference

Perceptions regarding two different types of headphones were also sought and preference examined through differential rating scales using standard items. These were sleep friendly headphones and noise cancelling earphones. Descriptive statistics illustrate participants' scores and help to understand preference; results are shown in Figure 4 and Table 2.

Figure 4: Comparison of participants' scores on headphone questionnaires
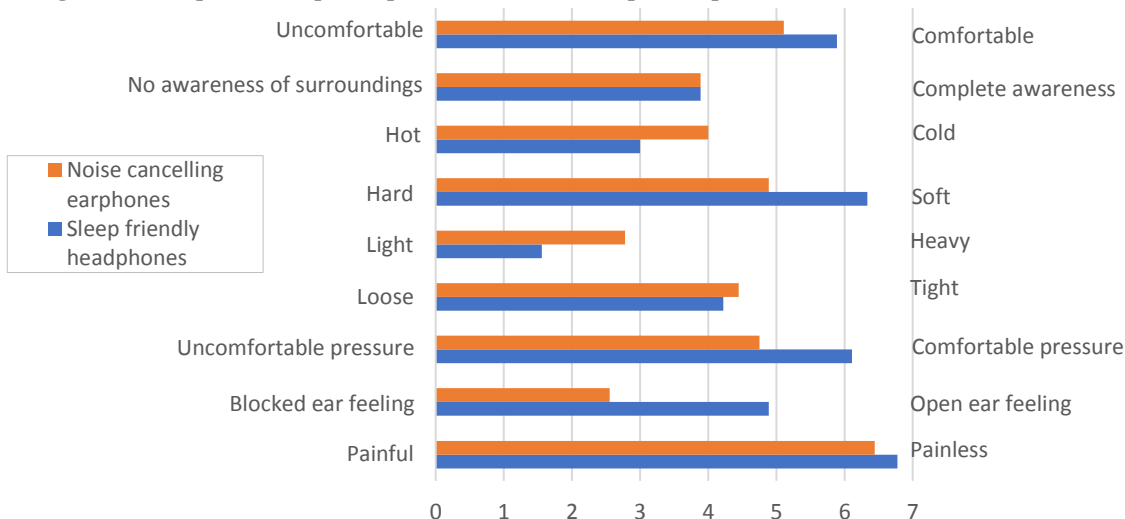
Table 2: Participants' scores on headphone questionnaires

Type		Painful (0) or Painless (7)	Uncomfortable (0) or Comfortable (7)	Pressure (0-7)	Loose (0) or Tight (7)	Light (0) or Heavy (7)	Hard (0) or Soft (7)	Hot (0) or Cold (7)	No (0) or total awareness (7)	Blocked (0) or Open ear (7)
Noise cancelling	μ	6.4	5.1	4.8	4.4	2.8	4.9	4.0	3.9	2.6
	SD	0.7	1.3	1.5	1.3	1.1	0.8	0.5	1.2	1.6
Sleep friendly	μ	6.8	5.9	6.1	4.2	1.6	6.3	3.0	3.9	4.9
	SD	0.4	1.6	1.1	1.5	0.7	1.0	0.9	1.9	1.5

Objectively, both the noise cancelling earphones and sleep friendly headphones scored very similarly across all scales. The sleep friendly headphones were perceived to be softer, which may improve longer term comfort when in use. Similarly, these headphones also rated higher on the perceived pressure they exerted on the head and yielded an open ear feeling. In contrast, the noise cancelling earphones were less tight, cooler and exerted substantially less pressure on participants. Based on these initial results, it can be seen that both types have strengths and weaknesses, which may make choice depend on individual preference. Indeed, analysis of the qualitative data reveal additional dimensions to how participants perceived the two types of headphones.

Noise cancelling earphones

The noise cancelling earphones were praised for their ability to dim overall background noise but retain a sense of the soundscape and ability to hear conversations. Both these elements were considered important for maintaining a sense of awareness. For example, participants noted:

> *"The best sound cancelling headphones I ever tried, want some! I can still hear human activity but it's not intrusive. No longer feel like I'm in a general public space."*

> *"Could hear sounds and conversations clearly. Very quiet overall but conversations could be heard."*

Participants who had not tried noise cancellation before had mixed reactions. While they were impressed with the effect, they also found the experience needing to get used to. For example, one such participant noted:

> *"The deep in overall sound pressure level in the outer ear is very dramatic. Whilst the earpieces are reasonably comfortable to wear, the physical pressure of the ear pieces on the pinna is likely to become uncomfortable over a prolonged period of time."*

Despite such reservations, overall impressions were positive with noise cancellation perceived to be beneficial in creating a relaxing and calming experience. Typical participant comments included:

> *"I feel calm because I can hear the surrounding sound with much lower noise."*

> *"In terms of when you are trying to relax, I think this will definitely help reduce perceived noise."*

Finally, in terms of application in different hospital settings, participants at the workshop saw both benefits and challenges. Some were concerned about how practical it would be having additional wires around patients, while others were concerned about using earphones with unconscious patients in particular:

> *"I don't know how many times you've struggled to put in, like, you know, earplugs... you can put them wrong in yourself, let alone putting them wrong into somebody else."*

Nurses from intensive care units in particular saw great potential in noise cancellation, with one senior nurse commenting:

> *"I would love to try noise cancellation... and I think in an Intensive Care Unit the privilege we have is the staffing ratio we have. So, although it may be very busy and one might think that managing cardiovascular drugs or the monitor is more important, actually, I think we're getting to a state where we understand that the longer journey is of importance. So, I think people would rate this quite highly... I just, I think there is a place for noise cancellation in the Intensive Care Unit."*

Future work can more formally examine the opportunities presented by noise cancellation in different hospital environments, and with different patient groups. The potential of noise cancelling earphones to improve health professional communication, as well as wellbeing, was also mentioned by some participants and indicates a promising avenue for future research.

Sleep friendly headphones

Sleep friendly headphones were, unsurprisingly, rated very highly on comfort by most participants. The material, look and feel of these headphones featured highly in participants' comments, for example:

> *"The headphones are really soft and feel like a nice beanie. They are not tight nor loose."*

> *"Super comfy - could easily feel like they aren't there."*

> *"I've been alongside a very frail mother in hospital a great deal recently, that I actually feel that she would have benefitted greatly from having just even the touch of the fleece on her head."*

Lacking a noise cancelling function, participants experienced the sleep friendly headphones using different kinds of sound masking files (synthetic, natural sounds). The combination of the sound masking and these headphones was perceived to be very effective by participants. Many commented on the positive effect this had on improving their perception of the soundscape:

> *"I loved this one! It felt comfortable to wear and I loved the sound of rain in my ears. I felt a lot more alert and aware of my surroundings, yet comfortable and relaxed."*

Participants saw great potential in terms of application to healthcare, although some expressed concerns over using these in a hot hospital environment. For example, participants noted:

> *"These are way more comfy than standard ear plugs so [patient] compliance to wear probably quite high."*

> *"Might get hot and sweaty in hospital environment."*

> *"They do get somewhat warm and that's slightly unpleasant."*

A future research project could see these features being examined more systematically with different service users in actual clinical settings. This would allow some concerns, for example over using these in a hotter hospital environment, to be explored more systematically and in greater depth.

Conclusion

In summary, the noise cancelling earphones were generally positively received for creating a less noisy and calmer environment. However, some participants found the sleep friendly headphones more comfortable to use. Moreover, in the main, sound masking helped create a more comfortable and relaxed environment although some participants were more sensitive to, and had stronger preference for, some of the masking sounds compared to others.

Overall, all participants and stakeholders saw the potential of the interventions for improving the experience of the hospital soundscape in different environments. It was suggested that sound masking could be beneficial in open plan hospital areas; sleep friendly headphones could be received well in areas with frail patients; and noise cancelling headphones could be used in acute hospital settings. Moving forward, each intervention will need to be carefully studied in different environments, taking extra care to allow for a sufficient habituation time before objective measurements of their effects can be considered.

This first phase of HPNoSS demonstrated the potential of bringing together a diverse group of stakeholders combining the sciences, arts, industry, creative and cultural sectors to the study of a long-standing and complex problem like hospital noise and sleep. The next phase of HPNoSS will see the conclusions and insights gained from the workshop inform the

development of a series of feasibility studies to develop further and examine these interventions in different clinical settings.

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A video summary of the HPNoSS Workshop can be accessed here: http://www.sensitivebrigade.com/HPNoSS.htm

Please follow the project website and twitter accounts for news and updates:

https://www.kcl.ac.uk/Cultural/-/Projects/Hospital-Project-on-Noise-Sound-and-Sleep.aspx

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HPNoSS is a collaboration between King's College London's Florence Nightingale Faculty of Nursing, Midwifery & Palliative Care and the University of the Arts London's College of Communication, supported by the Cultural Institute at King's.

December 2017