

# Best Evidence Summaries of Topics in Mental Healthcare

**BEST** *in* **MH** *clinical question-answering service*

## Question

“In healthcare settings what is the association between physical environment and staff wellbeing/patient clinical outcomes?”

## Clarification of question using PICO structure

<i>Patients:</i>	Patients and staff in healthcare settings
<i>Intervention:</i>	Interventions that alter the physical environment of the healthcare setting
<i>Comparator:</i>	Physical environments that have not been altered in the healthcare setting
<i>Outcome:</i>	Staff wellbeing and patient clinical outcomes

## **Clinical and research implications**

There was some limited evidence, from one high quality systematic review, indicating that music interventions may be effective in reducing patient anxiety in a variety of healthcare settings. The results of an earlier, weaker systematic review suggested that increased sunlight and presence of windows or windows with a natural view may also improve patient outcomes. There was insufficient evidence to draw any conclusions about the effects of workplace environment on the wellbeing of healthcare staff. Further, high quality studies are needed to support the development of guidelines for designing healthcare environments.

### **What does the evidence say?**

#### ***Number of included studies/reviews (number of participants)***

We identified three systematic reviews, which were considered relevant to this evidence summary.<sup>1,2,3</sup> Two reviews assessed the effects of various environmental interventions on multiple clinical outcomes, in patients in a variety of healthcare settings.<sup>1,2</sup> The third review considered the psychological effects of the work environment on healthcare personnel.<sup>3</sup>

#### ***Main Findings***

The first systematic review included 30 studies, all of which assessed multifaceted interventions.<sup>1</sup> These were grouped into whole environment interventions, ambient features, architectural features and interior design features.<sup>1</sup> Overall, results were generally inconsistent across studies. The only areas with broadly consistently positive associations were increased sunlight and presence of windows or windows with a natural view.<sup>1</sup> The later Cochrane systematic review of the effects of environmental stimuli on patient outcomes included 102 studies, most of which (85) assessed music interventions.<sup>2</sup> Music was associated with a reduction in anxiety compared to standard care; standard mean difference (SMD) -0.55 (95% CI: -0.74 to -0.36), 29 studies across a variety of settings, n=1812 participants.<sup>2</sup> There was also some evidence that music was associated with a reduction in heart rate compared to standard care; SMD -2.72 (95% CI: -4.70 to -0.74), 21 studies across a variety of settings, n=1653 participants.<sup>2</sup> There was no strong evidence of an effect on patient outcomes for any other environmental stimuli intervention or outcome measure.<sup>2</sup> The second Cochrane review, which considered the psychological effects of the work environment on healthcare personnel, included only one study.<sup>3</sup> This study reported that staff working on a renovated ward had experienced improved mood (reduced depression scores), where staff on the control ward remained unchanged, however, no between group comparisons were reported and there were no significant changes in ward atmosphere or unscheduled absences.<sup>3</sup>

#### ***Authors Conclusions***

One systematic review concluded that the results of studies applying multiple environmental stimuli simultaneously support the idea that the physical healthcare environment affects the well-being of patients, but there is insufficient evidence to support the development of guidelines for designing healthcare environments. A later Cochrane review concluded that music interventions may improve patient-reported outcomes in certain circumstances, but that evidence for other environmental interventions is limited. A further Cochrane review, focusing on healthcare staff, found only one study and concluded that there is insufficient evidence to support or refute the impact of the physical healthcare environment on work-related outcomes of healthcare staff.

### **Reliability of conclusions/Strength of evidence**

One systematic review with some methodological and reporting weaknesses<sup>1</sup> and one high quality Cochrane review<sup>2</sup> assessed the effects of environmental interventions on patient clinical outcomes. Both reported data for various interventions and patient groups. Findings were generally inconsistent and there was a lack of strong evidence to support the effectiveness of any environmental intervention.<sup>1,2</sup> There was some evidence, from 29 studies included in a high quality systematic review, to suggest that music interventions may reduce anxiety compared to standard care.<sup>2</sup> However, between study heterogeneity was high and most of the 29 studies were considered to be at high risk of bias.<sup>2</sup> There was also some indication, from a small number of studies included in a weaker systematic review, that increased sunlight and presence of windows or windows with a natural view may improve patient outcomes.<sup>1</sup> There was insufficient evidence to draw any conclusions about the effects of workplace environment on the psychological wellbeing of healthcare staff.<sup>3</sup>

### **What do guidelines say?**

Neither NICE nor SIGN guidelines offer guidance regarding an association between physical environment and staff wellbeing/patient clinical outcomes in healthcare settings.

**Date question received:** 12/06/2014  
**Date searches conducted:** 17/06/2014  
**Date answer completed:** 14/07/2014

### **References**

1. Dijkstra, K., Pieterse, M., & Pruyn, A. (2006). Physical environmental stimuli that turn healthcare facilities into healing environments through psychologically mediated effects: systematic review. *Journal of Advanced Nursing*, 56(2), 166–181
2. Drahota, A., Ward, D., Mackenzie, H., Stores, R., Higgins, B., Gal, D. and Dean, T.P. (2012) Sensory environment on health related outcomes of hospital patients. *Cochrane Database of Systematic Reviews*
3. Tanja-Dijkstra, K., Pieterse, M.E. (2011) The psychological effects of the physical healthcare environment on healthcare personnel. *Cochrane Database of Systematic Reviews*.

## Results

### *Systematic Reviews*

Author (year)	Search Date	Inclusion criteria	Number of included studies	Summary of results	Risk of bias
Dijkstra et al. (2006)	Summer 2005	<p><i>Participants:</i> Patients staying in a healthcare setting for any length of time.</p> <p><i>Intervention:</i> Environmental stimuli in healthcare settings, defined as follows: part of the (shared) healthcare environment and can be classified as ambient, architectural or interior design features that are purely stimulus objects (i.e. not interactional) and which influences patients through mediation by psychological processes. Studies assessing single or multiple stimuli were eligible for inclusion. Studies were excluded if the intervention was confounded by concomitant non-environmental changes, such as changes in the nursing care policy.</p> <p><i>Comparator:</i> Other environmental stimuli, or no environmental stimuli.</p> <p><i>Outcome:</i> Clinical outcomes (e.g. length of stay, medication intake, or pain); psychological outcomes (e.g. mood, stress, or satisfaction with</p>	n = 30 studies	<p>This systematic review aimed to assess the effects of physical environmental stimuli in healthcare settings on the health and well-being of patients.</p> <p>The review included 30 studies; 2 randomised controlled trials, 18 non-randomised controlled clinical trials and 10 which were described as ‘natural experiments.’</p> <p>All of the included studies assessed interventions involving multiple stimuli. Participant groups, interventions and outcome measures varied widely between studies.</p> <p><i>Whole area change:</i> Eleven studies assessed whole area renovation/redecoration. These studies were subdivided by setting. Six trials involved in-patient wards and reported</p>	<p>The article reported a clear research question and defined appropriate inclusion criteria.</p> <p>A number of bibliographic databases were searched for relevant studies and electronic searches were supplemented by screening the reference lists of relevant review articles. However, some language restrictions were applied and un-</p>

		<p>care).</p> <p><i>Study design:</i> Controlled clinical trials, published in peer reviewed journals.</p>	<p>mixed results. Three trials were conducted on psychiatric wards of which one found improvements in social behavioural measures associated with the intervention (one found no change and the other reported a deterioration), the second trial reported improvements in negative self-image and the third trial reported improvements in pathological behaviours. A study conducted in a ward for people with 'mental handicap' reported that normalisation of an institutional setting was associated with improved measures of occupation and activity, but decreased self-help. A progressive care unit for medical-surgical patients was associated with improved social activity and mobility. All studies were conducted before 1990. Three trials focused on redecoration of treatment areas and two on waiting rooms; none of these studies reported data on patient clinical outcomes or staff wellbeing.</p> <p>The remaining studies of the healthcare environment were divided into those focusing on ambient feature, architectural features and interior design features.</p> <p><i>Ambient features:</i></p>	<p>published studies were excluded.</p> <p>No details of the review process (e.g. number of reviewers involved and checking process) were reported. It is therefore not possible to assess the potential for error and/or bias in the review process.</p> <p>The authors stated that they assessed the methodological quality of included studies, but no details of this process were reported.</p> <p>The use of a narrative synthesis was appropriate.</p>
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			<p>Four studies investigated the effects of sunlight. Two studies reported positive effects of increased sunlight in patients with depression and bipolar depression, however the second study reported a marginal effect in favour of lower sunlight for patients with unipolar depression. Two further studies reported that increased sunlight was associated with reduced length of stay and reduced mortality in patients post-MI and reduced stress and pain in patients post-spinal surgery. Four studies assessed the effects of sound. One noise reduction study reported positive effects on re-hospitalisation rates and medication use on a coronary ICU and one study reported that ocean noises during the night improved self-reported sleep measures, post-surgery on a coronary ICU. Two studies of music interventions did not report any data on patient clinical outcomes or staff wellbeing.</p> <p><i>Architectural features:</i></p> <p>Three studies compared the presence or absence of windows, or the presence of a natural view. Overall, the presence of windows and the presence of a natural view had positive effects on clinical outcomes, such as delirium, sleep and the length of</p>	
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				<p>stay. Three studies assessed spatial layout; there were generally no effects on clinical outcomes, with only one study reporting a marginally statistically significant increase in anxiety on a Nightingale ward compared to a bay ward.</p> <p><i>Interior design features:</i> Two studies on the introduction of natural elements through pictures or video reported small or non-significant clinical effects. One study reported that seating arrangements could increase social interactions in male psychiatric patients.</p> <p>None of the studies in this review assessed staff wellbeing.</p>	
Drahota et al. (2012)	01/2006	<p><i>Participants:</i> Adults attending hospital as in-patients, day hospital or out-patients.</p> <p><i>Intervention:</i> Interventions that altered the environment by one or a mixture of ways, including providing positive distracters, and reducing environmental stressors.</p> <p><i>Comparator:</i> Environments not altered in the ways mentioned above.</p>	n=102 studies	<p>This Cochrane review aimed to assess the effect of hospital environments on adult patient health-related outcomes.</p> <p>The review included 102 studies, most of which (85 studies) assessed music interventions. Other interventions assessed were: 'positive distracters', to include aromas (two studies), audio-visual</p>	<p>The review reported a clear research question and defined appropriate inclusion criteria.</p> <p>Searches included a wide range of</p>

		<p><i>Outcome:</i> Measures of: anxiety; pain; length of hospital stay; patients' satisfaction; quality of sleep; aggression and mood; physiological outcomes; medication utilisation; hospital-acquired infections; and mortality.</p> <p><i>Study design:</i> Randomised and non-randomised controlled trials; before and after studies with at least two intervention sites and two concurrent control sites, with outcomes measured before and after the intervention was implemented; interrupted time series with at least three data collection points both before and after the intervention.</p>	<p>distractions (five studies), decoration (one study); interventions to reduce environmental stressors through physical changes (three studies), bedroom type (one study), flooring (two studies), furniture and furnishings (one study), lighting (one study), and temperature (one study); and multifaceted interventions (two studies). No studies meeting the inclusion criteria were identified that evaluated art, access to nature, interventions to reduce hospital noise, patient controls, technologies, way-finding aids, or the provision of windows.</p> <p><i>Music interventions:</i> The results of meta-analyses indicated that music was associated with a reduction in anxiety compared to standard care; standard mean difference (SMD) -0.55 (95% CI: -0.74 to -0.36), 29 studies across a variety of settings, n=1812 participants. There was also some evidence that music was associated with a reduction in heart rate compared to standard care; SMD -2.72 (95% CI: -4.70 to -0.74), 21 studies across a variety of settings, n=1653 participants. Evidence for an effect on other physiological outcomes (e.g. blood pressure and respiration rates) was inconsistent.</p>	<p>bibliographic databases, as well as sources of grey literature. No language or publication status restrictions were reported.</p> <p>The review process included measures to minimise error and/or bias and the risk of bias in the included studies was formally assessed.</p> <p>The statistical analyses were broadly appropriate and possible sources of between study heterogeneity were explored.</p>
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				<p><i>Aroma:</i> Two studies assessed aroma. One study reported that, in patients undergoing radiotherapy, there were significantly fewer anxious patients in the placebo group. The other study found that lavender oil was associated with significant reductions in agitation in psychogeriatric patients.</p> <p><i>Audio-visual distractions:</i> Five RCTs assessed audio-visual distractions; three were carried out during endoscopy interventions, one was conducted during dressing changes for burns, and one during the post-operative period. All interventions were nature-based. There were no statistically significant effects on anxiety (n=2 studies). One study found no significant effect on pain and one reported that the intervention was associated with a small reduction in pain (SMD -1.72 (95% CI: -2.66 to -0.78)).</p> <p><i>Other interventions:</i> There was no strong evidence for a treatment effect, on any outcome measure, for decoration (different paint colours on the walls at the foot of patients' beds, n=1</p>	
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				<p>study), hospital air quality (n=3 studies), bedroom type (n=1 study), flooring (n=2 studies), furniture n=1 study), lighting (n=1 study), or multifaceted environment changes (n=2 studies).</p> <p>None of the studies in this review assessed staff wellbeing.</p>	
Tanja-Dijkstra & Pieterse (2011)	11/2006 and 07/2008	<p><i>Participants:</i> Medical and paramedical personnel who are directly involved in treatment and care of patients in healthcare settings.</p> <p><i>Intervention:</i> Interventions involving work-related effects of environmental stimuli in healthcare settings.</p> <p><i>Comparator:</i> Environmental stimuli, or no environmental stimuli.</p> <p><i>Outcome:</i> Job satisfaction (e.g. work morale, stress, burnout, sick leave); satisfaction with the physical healthcare environment; quality of life (e.g. mood, well-being); and quality of care (such as medical errors).</p> <p><i>Study design:</i> Randomised and non-randomised controlled trials; controlled before and after studies; interrupted time series.</p>	n=1 study	<p>This Cochrane review aimed to assess the psychological effects of the physical healthcare environment on healthcare personnel.</p> <p>One controlled before and after study, assessing the effects of multiple environmental stimuli, was included in the review.</p> <p>Intervention details: The dayroom ceiling was lowered and shaded lighting was installed. Light-coloured floor tiles were laid and the walls were covered with vinyl in calm colours and sylvan designs. The room was divided by waist-high walls into a dining area and three separate seating areas with all furniture regrouped. The nursing station was relocated for maximum viewing. The ceiling was also lowered in the bedrooms and central hallway where</p>	<p>The review reported a clear research question and defined appropriate inclusion criteria.</p> <p>Searches included a wide range of bibliographic databases, supplemented by screening of the reference lists of included studies. No language or publication status restrictions were reported.</p> <p>The review process</p>

			<p>recessed lighting, vinyl walls, and archways were installed, along with a small seating area, full carpeting, and non-institutional clocks and other wall hangings. No details of the control condition were reported.</p> <p>Staff working on the renovated ward showed improved mood levels (lower depression scores), whereas depression scores remained the same in those working on the control ward; no direct, between group, comparison data were reported. There were no statistically significant differences in ward atmosphere or unscheduled absences.</p>	<p>included measures to minimise error and/or bias and the risk of bias in the included studies was formally assessed.</p> <p>Only one study was included and no synthesis was therefore possible.</p>
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## Risk of Bias

Author (year)	Risk of Bias				
	Inclusion criteria	Searches	Review Process	Quality assessment	Synthesis
Dijkstra et al. (2006)					
Drahota et al. (2012)					
Tanja-Dijkstra & Pieterse (2011)					

 Low Risk

 High Risk

 Unclear Risk

## Search Details

Source	Search Strategy	Number of hits	Relevant evidence identified
<i>SRs and Guidelines</i>			
NICE	environment facility	171	0
DARE	1 (environment* adj5 design*) IN DARE 15 Delete 2 (healthcare AND environment* adj5 design*) IN DARE 2 Delete 3 ((environment* or ambien*) adj5 (design* or feature* or stimuli*)) IN DARE 18 Delete 4 (healthcare AND (environment* or ambien*) adj5 (design* or feature* or stimuli*)) IN DARE 3 Delete 5 (physical adj5 environment*) IN DARE 37 Delete 6 (physical adj5 healthcare adj5 environment*) IN DARE 2 Delete 7 (workplace) IN DARE 160 Delete 8 ((environment* or ambien*) adj5 (design* or feature* or stimuli*)) IN DARE 18 Delete 9 (workplace adj5 (ambien* OR environment* OR design* OR feature* OR stimuli*)) IN DARE 12 Delete 10 (healthcare adj5 (facility OR facilities)) IN DARE 9 Delete 11 (facility OR facilities) IN DARE 360 Delete 12 ((facility OR facilities) adj5 (environment* OR ambien* OR design* or construction* or environment*)) IN DARE 11 Delete 13 MeSH DESCRIPTOR Workplace EXPLODE ALL TREES 110 Delete 14 MeSH DESCRIPTOR Environment Design EXPLODE ALL TREES 18 Delete 15 MeSH DESCRIPTOR Facility Design and Construction EXPLODE ALL TREES 36 Delete 16 MeSH DESCRIPTOR Health Facilities EXPLODE ALL TREES 2415 Delete 17 (health* adj2 (facility OR facilities) adj5 (environment* OR ambien* OR design* or construction* or environment*)) IN DARE 7 Delete 18 MeSH DESCRIPTOR Health Facility Environment EXPLODE ALL TREES 12 Delete	164	3

	<p>19 MeSH DESCRIPTOR Hospital Design and Construction EXPLODE ALL TREES 11 Delete</p> <p>20 (hospital adj5 (ambien* OR environment* OR design* OR feature* OR stimuli*)) IN DARE 19 Delete</p> <p>21 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 2921 Delete</p> <p>22 (morale) IN DARE 18 Delete</p> <p>23 (patient* adj3 outcome*) IN DARE 1659 Delete</p> <p>24 (patient adj3 wellbeing) IN DARE 2 Delete</p> <p>25 ((staff OR patient) adj3 morale) IN DARE 2 Delete</p> <p>26 (productiv* OR efficien*) IN DARE 397 Delete</p> <p>27 (staff adj3 (productiv* OR efficien*)) IN DARE 0 Delete</p> <p>28 (psycholog* adj3 (wellbeing OR effect*)) IN DARE 123 Delete</p> <p>29 MeSH DESCRIPTOR Morale EXPLODE ALL TREES 1 Delete</p> <p>30 MeSH DESCRIPTOR Efficiency EXPLODE ALL TREES 49 Delete</p> <p>31 #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 2161 Delete</p> <p>32 #21 AND #31 164</p>		
<b>Primary studies</b>			
PsycINFO	<p>1. PsycINFO; "physical environment".ti,ab; 2495 results.</p> <p>2. PsycINFO; (pleasant adj3 surroundings).ti,ab; 19 results.</p> <p>3. PsycINFO; (pleasant adj3 environment).ti,ab; 53 results.</p> <p>4. PsycINFO; INTERIOR DESIGN/; 385 results.</p> <p>6. PsycINFO; "interior design".ti,ab; 117 results.</p> <p>7. PsycINFO; HOSPITAL ENVIRONMENT/; 1510 results.</p> <p>8. PsycINFO; 1 OR 2 OR 3 OR 4 OR 5 OR 6; 4421 results.</p> <p>9. PsycINFO; WELL BEING/ OR MENTAL HEALTH/ OR HEALTH/; 99903 results.</p> <p>10. PsycINFO; TREATMENT OUTCOMES/; 25123 results.</p> <p>11. PsycINFO; (wellbeing OR well-being OR "clinical outcomes" OR "patient outcomes").ti,ab; 56082 results.</p> <p>12. PsycINFO; ("better care" OR "treatment efficacy" OR productivity).ti,ab; 14058 results.</p> <p>13. PsycINFO; (quality OR improve*).ti,ab; 362914 results.</p>	1089	0

	14. PsycINFO; 9 OR 10 OR 11 OR 12 OR 13; 485965 results. 15. PsycINFO; 8 AND 14; 1089 results.		
Embase	1. EMBASE; "physical environment".ti,ab; 2570 results. 2. EMBASE; "interior design".ti,ab; 146 results. 3. EMBASE; HOSPITAL DESIGN/; 7708 results. 4. EMBASE; 1 OR 2 OR 3; 10353 results. 5. EMBASE; WELLBEING/; 33318 results. 6. EMBASE; TREATMENT OUTCOME/; 632382 results. 7. EMBASE; HEALTH CARE QUALITY/; 184283 results. 8. EMBASE; wellbeing.ti,ab; 9010 results. 9. EMBASE; 5 OR 6 OR 7 OR 8; 843223 results. 10. EMBASE; 4 AND 9; 446 results.	446	0
Cinahl	30. CINAHL; "physical environment".ti,ab; 828 results. 31. CINAHL; (pleasant adj3 surroundings).ti,ab; 9 results. 32. CINAHL; (pleasant adj3 environment).ti,ab; 40 results. 33. CINAHL; "interior design".ti,ab; 37 results. 34. CINAHL; HEALTH FACILITY ENVIRONMENT/; 3875 results. 35. CINAHL; "hospital environment".ti,ab; 825 results. 36. CINAHL; "physical surroundings".ti,ab; 25 results. 37. CINAHL; 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36; 5393 results. 38. CINAHL; (wellbeing OR well-being OR "clinical outcomes" OR "patient outcomes").ti,ab; 33552 results. 39. CINAHL; TREATMENT OUTCOMES/; 114219 results. 40. CINAHL; "OUTCOMES (HEALTH CARE)"/; 24805 results. 41. CINAHL; 38 OR 39 OR 40; 165436 results. 42. CINAHL; 37 AND 41; 369 results.	369	0
Summary	NA	NA	

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