



CW+ CRITICAL CARE PROJECT:

Evaluation of enhancements to the design and environment of the Adult Intensive Care Unit at Chelsea and Westminster Hospital – summary report



Introduction

Beginning in 2017, the CW+ Critical Care Campaign raised £12.5 million for the redevelopment of both Adult and Neonatal Intensive Care Units at Chelsea and Westminster Hospital, the total cost of which was around £36 million. The project saw both units completely rebuilt, with an expanded footprint allowing for new facilities for patients, staff and relatives, as well as new equipment and IT infrastructure. Evaluation of the redevelopment has focused on the environmental enhancements made within the Adult Intensive Care Unit (AICU), which were made possible with the generous support of the Julia and Hans Rausing Trust as well as other donors. The redevelopment included a 45% expansion in size, numerous technological and environmental enhancements, and new respite spaces including the Sky Garden. The project saw the unit change from a centralised space, with a single nurses' station overseeing 11 beds, to a decentralised space stretching across two perpendicular corridors, with 10 small workstations spread out between 20 individual rooms. Most of the patient rooms feature large windows showing panoramic views of London, as well as a television and advanced monitoring equipment on a specialised pendant mount. Staff spaces were also significantly expanded, with new offices and a large staff rest space and teaching room, while new facilities for relatives included two overnight rooms, a kitchenette, a private discussion room, and expanded waiting areas featuring large-scale lightbox artworks.



The AICU, before (top) and after (bottom) redevelopment

Evaluation methods

This evaluation drew on a number of methodologies, led in part by projects and data collection processes undertaken from 2017 onwards, and using reports or documentation from these as a source of baseline data. Quantitative data sources included: an array of environmental sensors installed around the unit; a 'Happy or Not' feedback terminal for use by relatives and staff; data relating to staff usage of 'Sleep Pods' in the Sky Garden; and

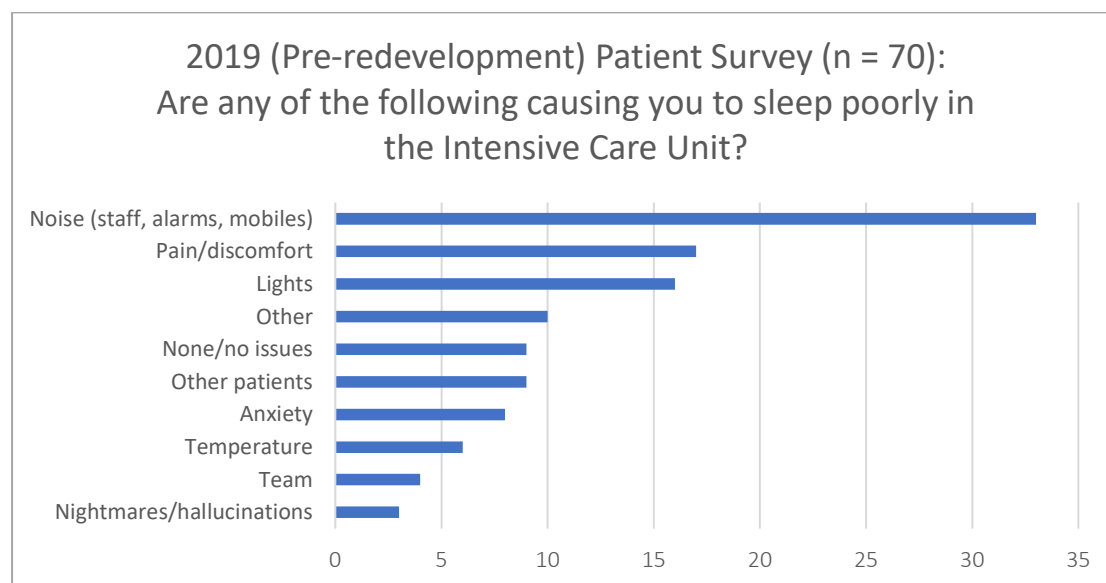


surveys distributed to staff, patients and relatives both before and after the redevelopment. This was augmented with qualitative data collected from AICU staff, including from a focus group, an interview, and a 'participatory data analysis' session.

Impact on patients

Ever since Roger Ulrich's pioneering 1984 study showed that patients with a view of nature from their window had better clinical outcomes than those who did not, there has been a renewed focus on the influence of a patient's environment on their recovery. In the redevelopment of the AICU, this was reflected in a focus on such environmental factors as sound, temperature and light.

Sound levels - In critical care, excessive sound levels can not only affect quality of sleep, but potentially also act as a risk factor for the development of delirium. Noise was known to be problematic on the old unit: in a 2019 survey of AICU patients at Chelsea and Westminster Hospital it was the most frequently cited factor contributing to poor sleep, with twice as many patients mentioning noise than pain or discomfort (as shown in the graphic below). Around a quarter of patients surveyed at this time said that noise had been a source of stress or anxiety, as did a third of surveyed relatives.



In the 2022 staff survey, 81% of respondents said that noise levels were better in the new unit. This is reflected in data recorded by sound monitors: for example, 30% of measurements taken in the old unit show an average sound level exceeding 60 dB, whereas in the patient rooms of the new unit this is seen in only 8% of measurements. Similarly, 82% of the loudest sounds on the old unit exceeded 70 dB, whereas only 50% did in the new unit rooms. The most significant change has been in the level of background noise: 65% of the



time this exceeded 50 dB on the old unit, whereas such levels are only seen 17% of the time in the new unit rooms. The average sound level for the new patient rooms was 55.9 dB, which is around the level of a quiet office space, and similar to the levels reported in published research from other ICU noise reduction projects.

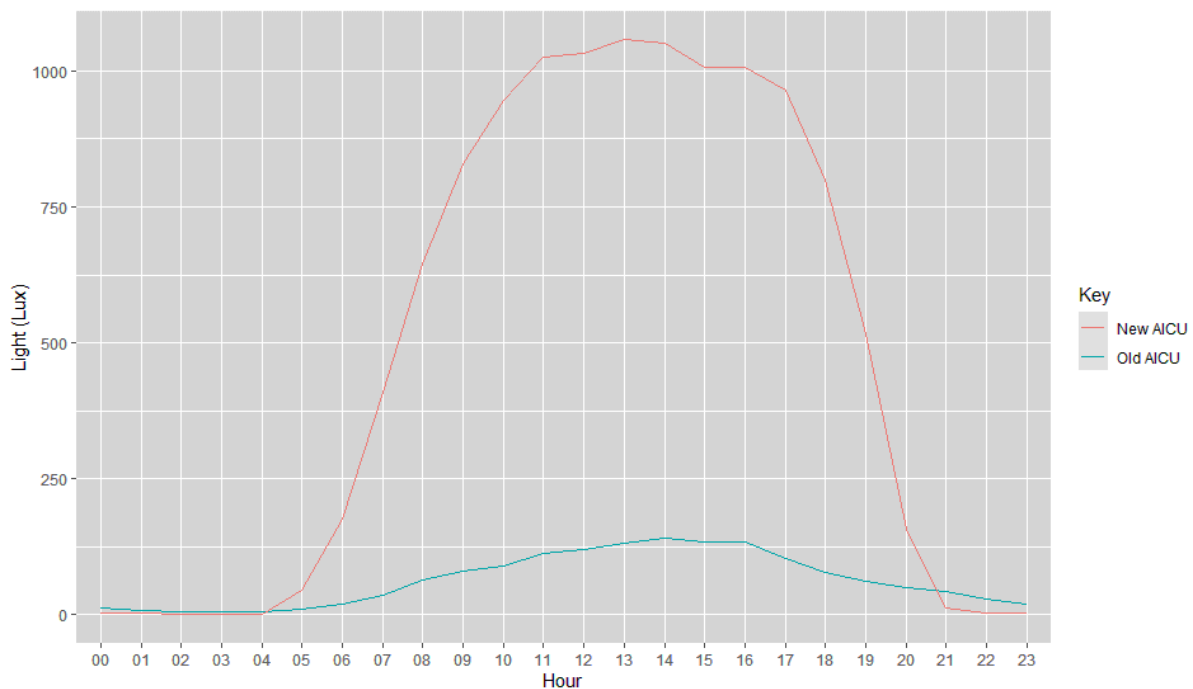
Sound level measurement:	Old AICU	New AICU room
Average (LAEQ) > 60 dB	30%	8%
Peak (LAFmax) > 70 dB	82%	50%
Background (LA90) > 50 dB	65%	17%

Temperature and light control – Control of light and temperature was another factor which was identified as a key outcome at the start of the project. These have also been shown to have an impact on patient recovery, with both heat and light being linked in research to reduced length of stay for patients. In the 2019 staff survey, only 42% of respondents said that temperature control was present, and this reflects data from temperature sensors showing that some spaces on the old unit reached temperatures as low as 7.2°C. In the 2022 staff survey, 71% of respondents said that control of light and heat was better in the new unit compared to the old, and a comparison of temperatures within a comparable 11-month period in the pre/post datasets shows that on average the new unit is 2.4°C warmer.

The changing of **light** throughout the day has an effect on a patient's body clock or 'circadian rhythm', and disruption to this can be a risk factor for the development of delirium. In the 2019 patient survey, light was mentioned as a factor contributing to poor sleep, gaining almost the same number of mentions as pain or discomfort. However, the extensive floor-to-ceiling windows of the new patient rooms have led to a dramatic increase in light levels, with daytime average light levels now more than eight times brighter than in the old unit.

This significant change can be seen in the graph below, which shows light levels across an average day for both old and new units. The sensor in the new unit was positioned in a patient room which was not often occupied during this period, with window blinds open almost all the time and artificial lights kept switched off: this graph can therefore be seen as an accurate reflection of the level of natural light entering the new side rooms. Staff participants in this evaluation were also enthusiastic about the change:

'[The] ambience has improved and the entry of natural light into each of the rooms is a massive improvement.'



'It's a lot lighter and brighter because of all the large windows... The brightness made a really big difference.'

Another staff member mentioned how the new light controls had enabled them to optimise the light level for patients:

'I go into the rooms and turn the lights down because I think it's nicer for [patients] – and... you can have colours. It's really nice'.

The **view** from the new windows was also commented on frequently by staff, with one survey respondent writing:

'The view helps my patient and relatives improve their wellbeing and recovery, and it's nice to work with a view as a member of staff too'.

(This is in stark contrast to the results of a 2019 patient survey, in which 73% of respondents rated the view as either 'poor' or answered 'not applicable'.)

76% of staff surveyed in 2022 agreed that the redevelopment of the unit had led to increased **positive patient feedback**. Increased privacy for patients, resulting from the change to a decentralised unit layout of individual side rooms, was highlighted by staff as having improved patient experience, as were the view, lighting and lack of noise.



'The patients who could talk, they've always been quite appreciative about the view. And the mood lights and quiet environment. So those are all very good, especially when the focus is on patient experience.'

The additional privacy for patients has also enabled personalised music performances on the unit. Between July 2021 and November 2022 there were 23 music performances on the AICU, from performers on the harp, violin and West-African Kora (shown in the image below). During the pandemic this work was undertaken remotely in collaboration with the Royal College of Music, who worked with CW+ artists to deliver a series of Zoom performances for ICU patients and staff. In feedback on the project, one staff member commented:



'I have thoroughly enjoyed Andy's Zoom performances on my lunch break. It was a welcome distraction and lifted my mood during a busy time. I have also seen the positive impact his performances have had on our patients. To see a patient clapping and mouthing along to his music, after a long admission in our ICU, was very touching!'

The **Sky Garden** was described as having a profound effect on patients that were taken there. In the 2022 staff survey, two-thirds of respondents reported that they taken a patient to the Sky Garden, with one saying that they did this every week.

'You can just see sometimes in the patient's face when you bring them to the Sky Garden. They just lighten up, especially patients that are just starting the rehab, the long rehab patients. They just lighten up when they can get out of the room, and see something different. Sometimes they cannot say anything, but you can just see it in their faces.'



'It's just really nice for them to have natural light and the plants... We took one patient out... we were just wheeling her to the CT and she just sort of went "Ah sun!" as she was wheeled out into it. The daylight, you know, she was just so relieved.'



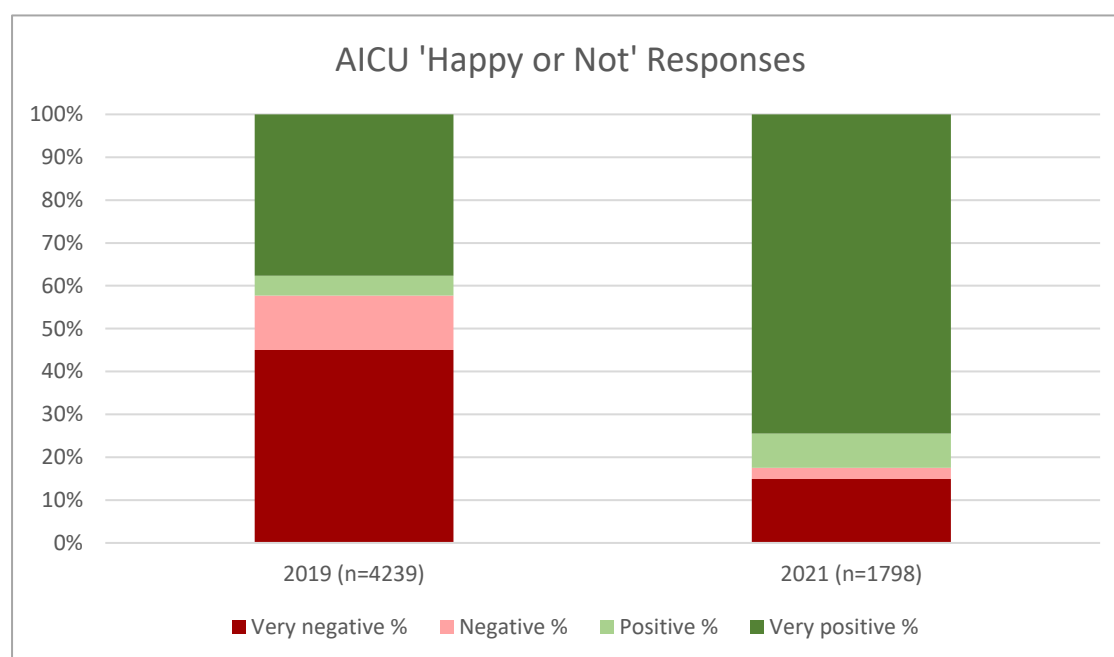
'A very good place to unwind and for patient and relatives to visit... We strongly encouraged patients to let them wander around the Sky Garden and made them aware that the facility is there for their use.'

Impact on relatives

The **experience of relatives** visiting the unit was universally seen by staff as having improved, with more spacious bed areas allowing for greater privacy, and expanded overnight facilities.

'It's amazing: the space, the waiting areas, the toilet facilities, the little kitchenette, overnight rooms.'

This is reflected in the data from a 'Happy or Not' terminal in the unit: following the redevelopment, 74.5% of respondents said they were 'very happy' with the environment, compared to 37.6% on the old unit (shown in the graphic below).



Staff in the focus group suggested that both the separated side rooms and the Sky Garden gave greater privacy to larger families, especially for end-of-life patients – this is particularly relevant considering the responses to the 2019 survey of relatives, in which lack of privacy was one of the most commonly cited factors affecting communication.

'I'll pick one good example of privacy: patients at end of life. And especially with big families, you can just close down the doors and curtains, [and] they can have their private moment.'



The Sky Garden was also mentioned as a useful space for relatives: staff in the focus group discussed how the Sky Garden space also brought added privacy for families and patients, with staff able to observe from a distance.

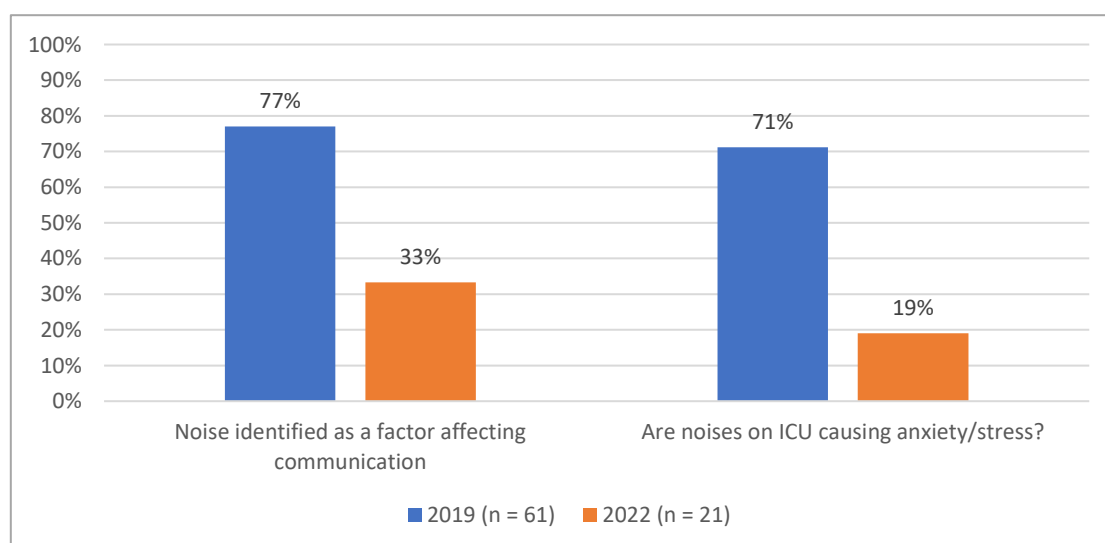
‘For me... you’re always with a patient when you go to the Sky Garden, or especially with their family, [you can] just leave them with their family and just look at them at a distance.’

Impact on staff

Staff also benefitted from environmental improvements to the unit, including a reduction in overall **noise levels** in the main corridor. As with the patient rooms, the most significant change was seen in the level of background noise: 65% of the time this exceeded 50 dB on the old unit, whereas in the new unit corridor such levels were only seen 7% of the time. Overall, average background sound levels in the corridor were 5.8 dB lower than in the old unit.

It is interesting to note that the loudest ‘peak’ sounds recorded in the new corridor have only seen a modest decrease in volume compared to the old unit, particularly around times of increased staff activity such as shift changeovers or ward rounds. The drop in background sound may also have had the effect of making peak noises in the corridor feel louder: this is supported by responses to the 2022 staff survey, in which there were increases in respondents identifying some specific sources of noise as disturbing daily work, including noise from machines and alarms, staff and ward activity.

However, there were large reductions in the number of surveyed staff identifying noise as something that affected their communication, or as a cause of anxiety or stress, as shown in the figure below.





Other environmental aspects of the unit were praised by staff in the focus group, with one participant describing the reaction of colleagues from another departments:

'That's really amazing about our ICU. They always come from outside and come into unit and envy the space. "Oh my God, you've got so much of light and airiness in here".'

81% of respondents to the 2022 staff survey said **facilities for staff** were better in the new unit, while the same number said that IT integration and data recording had also improved. In the staff focus group, advanced monitoring technology in the bed space was mentioned, as well as other IT equipment elsewhere around the unit:

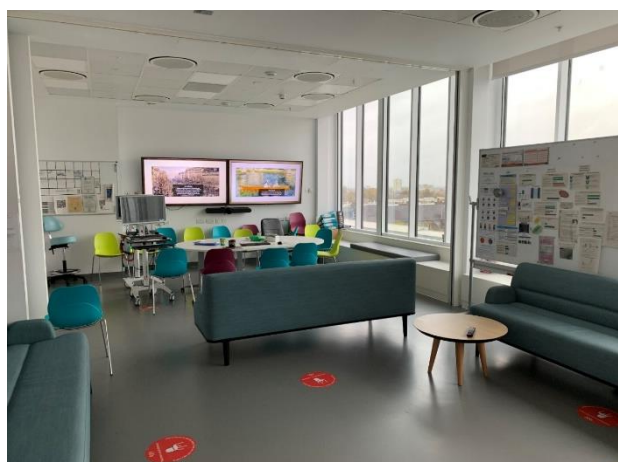
'You can see everything, when you look at your patient.... I think for me... it's safer, because you're aware of the environment, you can see everything.'

'You know all the hub rooms, and all the PCs, and the office space, and all the supporting rooms that we have, you know, it is totally amazing to have all of that stuff.'

As well as office space, staff respite and training spaces were also mentioned as being more relaxing than comparable spaces at other hospitals:

'I've worked in previous hospitals that have no space at all for a staff room so I guess we're lucky in that area, to have this staff room. And [the] teaching room as well, because we run our courses here, so it's very helpful as well.'

The old AICU staff room (left), compared with the new AICU staff room and teaching room (right)





'When compared to so many other offices around, you know, they're all crammed up in a small space, and we have the luxury of these huge vast offices and workspaces which we can use.'

The Sky Garden was also identified as a useful space for staff to take breaks, eat lunch or have meetings. Comments from staff suggested that the environment was something of a sanctuary, offering solitude, respite and a sense of having left the clinical space:

'Sometimes I eat my lunch in there. Especially, if you want to destress or be alone, at some point during the shift you can just go there and relax.'

'I've had meetings there as well. You know, had a bit of a one-to-one. And it's nice coming out of the unit, you really do feel like you've gone out somewhere for coffee, you know, it does feel nice.'

'I love the Sky Garden and use it for breaks on night-time.'

The Sky Garden also features 'Sleep Pods', which provide additional privacy for staff to take naps while on breaks. The pods automatically collect data on their usage, allowing for detailed analysis of how they are used by staff. An analysis of data between 29 January 2021 and 24 February 2022 reveals that the pods were used for a total of 1,280 individual rest sessions, with a total length of 33,812 minutes. On average, the pods were used around three times a day, for an average duration of around 26 minutes per rest.

The **increased space** of areas within the unit was perhaps the most significant impact on staff, facilitating the easy movement of patients and equipment, and leading to additional benefits for patient safety and staff wellbeing:

'That ergonomic space in the rooms is amazing. Not just obviously for our awake patients, but for working conditions. It's really positive.'

'The bed space is very spacious. It's not hard to move patients around, especially if they're going for transfers, it's not hard to bring the bed in and out.'

The **aesthetic** of the redeveloped space was mentioned as having created a calming environment for staff, which in turn enhanced overall staff satisfaction. In a comment during a participatory analysis meeting, one staff member even commented that seeing an online video of the redeveloped AICU had been a factor in their applying for a job on the unit.



'I think it's a beautiful place to work, so it's really wonderful.'

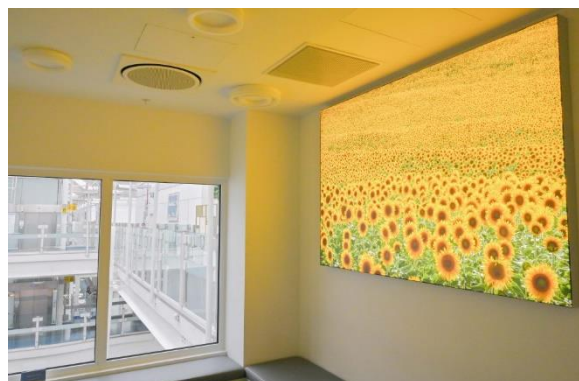
'It's like some sort of cave. It's very sort of calm, relaxing.'

Surveyed staff rated the new unit 7/10 for **calmness**, a marked increase from 4/10 in 2019. Other staff participants agreed that the environment had a positive impact on staff wellbeing:

'To be honest, the whole new ICU is probably the best environment I've worked in in the NHS... I think it definitely has an effect on your mood and makes you enjoy being there'.

'I definitely heard this one consultant saying, you know, he sort of feels better at the end of the day because he's just had a nicer environment to work in.'

The **artwork** on the unit may also have contributed to this sense of calm. The unit features three large lightbox artworks by photographer Charlie Waite, produced in association with Nature Works for Health. Two of these artworks are in the relatives' waiting area, and one in the unit's 'Discussion Room'. In an online survey set up to capture feedback on the artworks, respondents reported that they brought to mind such words as 'beauty', 'light' and 'warmth', while others commented on the artworks' effect on the workplace:



'They really are wonderful to look at and I feel very lucky to have them in my workplace. I love looking at them and always stop by to take a moment'.

Summary

The redevelopment of the AICU at Chelsea and Westminster Hospital has led to significant improvements to the experience of patients, relatives and staff. The environment is now more spacious, with expanded facilities for staff and greater privacy for patients and their families. The view from the unit, now fully visible through large floor-to-ceiling windows in almost all areas, has had a noticeable positive effect on almost all users of the space, and the Sky Garden has become a valued breakout space for staff and patients. The aesthetic improvements to the unit have had a positive impact on staff, with some saying that it had even influenced their decision to choose Chelsea and Westminster as a place to work, and



others commenting on its positive effect on their working wellbeing. At a time when demand on critical care services is expected to increase, alongside well-documented gaps in the clinical workforce, the impact of such environmental interventions should not be underestimated.

Acknowledgements

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