Technoleg Iechyd Cymru
Health Technology Wales

Topic Exploration Report [1]

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

- Determine the quantity of evidence available for a technology of interest.
- Identify any gaps in the evidence.
- Inform decisions on topics that warrant fuller assessment by Health Technology Wales (HTW).

Topic exploration report number	TER564
Topic	Non-contact, room-based monitoring for people receiving inpatient mental health services
Summary of findings	Patients in inpatient mental health care settings require regular monitoring and observation to ensure their own safety and the safety of others. Current practices of visual contact with patients by mental health ward staff are labour-intensive, potentially intrusive and disruptive, and limit staff from carrying out more therapeutic interactions. Technologies are available that can monitor patients in the periods between scheduled visual contacts and alert staff to potential incidents. This includes room-based systems that can use cameras or infrared sensors to monitor patients' vital signs, positioning in the room and activity, and give staff the opportunity to view patients remotely and receive notifications when an incident may be occurring. One mixed methods, non-randomised controlled before-and-after trial and two economic evaluations were identified. Use of the Oxevision vision-based patient monitoring and management system led to reductions in the number of bedroom self-harm incidents, including bedroom ligatures, in the before-and-after trial and was found to be acceptable to patients and staff. The economic evaluations predicted substantial cost savings associated with the use of Oxevision in addition to standard care in acute adult mental health, older adult mental health, and psychiatric intensive care settings compared to standard care alone. There is a limited evidence base available for room-based monitoring of mental health inpatients and all three studies identified were carried out at the same NHS Trust by the same research team, with a potential overlap in patient samples. Further evidence generation from different sites, and randomised if possible, would be beneficial.

[1] Cyfieithu dogfennau HTW wedi'u cyhoeddi o'r Saesneg i'r Gymraeg
Translation of published technical HTW documents from English into Welsh

Introduction and aims

Patients in inpatient mental health care settings require regular monitoring and observation to ensure their own safety, and the safety of others, due to either accidental injuries or deliberate harm. This is currently done via mental health ward staff making visual contact with patients at specified time intervals, or continuously if they are felt to be particularly high risk, a practice which is labour-intensive and limits staff from carrying out more therapeutic interactions. Patients often feel these observations are intrusive and disruptive.

Across the UK, mental health wards have started implementing technologies to aid in the monitoring of patients. This can include non-contact, room-based methods such as video observation or non-camera based methods that can detect the location and position of a person within a room. Oxevision is a system that uses infrared cameras to monitor vital signs and sleep patterns of patients, as well as their location. Staff can monitor patients remotely from a tablet and can view 15-second clear video footage to check on patients or view blurred footage after receiving an alert. These features are designed to maintain patient privacy. Another technology designed to monitor mental health inpatients, whilst maintaining their privacy, is Safehinge Primera Project X. This room sensor does not capture any personal images or identifiable information, however, information on how it does operate is lacking. These monitoring technologies aim to allow monitoring of patients in between scheduled observations by ward staff, allowing intervention of incidents that would otherwise be missed and also allowing ward staff more time to carry out other activities.

Health Technology Wales researchers searched for evidence on the clinical and cost effectiveness of non-contact, room-based monitoring of people in inpatient mental health services.

Evidence overview

Three sources of evidence were identified for this topic: one mixed methods, non-randomised controlled before-and-after evaluation and two economic evaluations. All of these evaluated the Oxevision vision-based patient monitoring and management system, and were conducted by the same research team at the same NHS Trust.

In the before-and-after trial, Ndebele et al. (2024) evaluated the rates of bedroom self-harm, including bedroom ligatures, before and after the implementation of the Oxevision system in one male and one female acute inpatient mental health ward in England. Observational wards were fitted with the system and the technology was used in addition to standard care; control wards did not use the Oxevision system. The authors found a 44% reduction (95% confidence interval [CI] -100% to -14%, $p < 0.002$) in bedroom self-harm incidents and a 48% reduction (95% CI -100% to -16%, $p < 0.001$) in bedroom ligatures when comparing observational wards to the control wards after the system's implementation. There was a non-statistically significant reduction in bedroom self-harm incidents of 22% (95% CI -100% to +19%, $p = 0.32$) in the observational wards after the system's activation compared with before. Qualitative data showed that patients generally found the monitoring system acceptable and felt it reassured them about their safety. Staff also found the system acceptable and felt it helped them to provide better care (14 out of 15 respondents) and all respondents agreed it had helped identify incidents that would have otherwise been missed.

The first of the economic evaluations assessed the cost effectiveness of using Oxevision, alongside standard care, in adult psychiatric intensive care units (Malcolm et al. 2022a). The model used an NHS England perspective and was structured as a cost calculator. Compared with standard care alone, the model estimated use of the Oxevision system could lead to cost savings of £72,286 per ward per year, with a cost saving to NHS England of £5.5 million per

Evidence overview

year. The main driver of the savings was found to be 36 hours of staff time saved per patient per year due to reduced one-to-one observations. The results were robust to scenario analyses.

The second economic evaluation assessed the cost effectiveness of using Oxevision, alongside standard care, in acute adult and older adult mental health wards (Malcolm et al. 2022b). The model was also structured as a cost calculator and used an NHS perspective with a time horizon of 12 months. This evaluation estimated the introduction of Oxevision in addition to standard care is likely to be cost saving in both acute adult and older adult mental health settings, with estimated savings of £272 and £4,591 per patient, respectively. This is stated to lead to estimated savings for NHS England of £22.3 million and £63.3 million per year, respectively.

Areas of uncertainty

- All three studies were carried out at the same NHS Trust, seemingly at the same time, meaning that the samples in the studies may be significantly overlapped. This means all of the identified evidence comes from a very small sample and there is a risk of double reporting when looking at clinical outcomes.
- Very little evidence has been identified on non-contact, room-based monitoring in mental health inpatient care and none of this evidence is from randomised trials.
- Though the identified trial states that patients generally found the Oxevision system to be acceptable, there are ethical concerns around the use of this system in inpatient mental health wards, including issues of consent, privacy and the legality of 24-hour observation.
- Evidence has only been identified on the Oxevision system, with no evidence found on other systems provided by the Topic Proposer.

Literature search results

Health technology assessments and guidance
No evidence identified
Evidence reviews and economic evaluations
Malcolm R, Shore J, Stainthorpe A, et al. (2022b). Economic evaluation of a vision-based patient monitoring and management system in an acute adult and an older adult mental health hospital in England. J Med Econ. 25(1): 1207-17. doi: https://doi.org/10.1080/13696998.2022.2147753
Individual studies
Ndebele F, Wright K, Gandhi V, et al. (2024). Non-contact monitoring to support care in acute inpatient mental health. J Ment Health. 33(3): 320-5. doi: https://doi.org/10.1080/09638237.2023.2245882
Ongoing research
No relevant ongoing studies were identified; however, a retracted study was found that may potentially be published again in the future. This study examined the Oxevision system and included data from five NHS Trusts in England. The study was retracted because the authors did not declare a conflict of interest due to their employment with Oxehealth Ltd. Kekic M, Rose A, Baker C, et al. (2024). RETRACTED: Reduced self-harm on acute mental health wards following the implementation of a vision-based patient monitoring system: Evidence from five NHS trusts. Journal of Psychiatric and Mental Health Nursing. 31(4): e1-e9. doi: https://doi.org/10.1111/jpm.13036
Citation searching
Malcolm R, Shore J, Stainthorpe A, et al. (2022a). Economic evaluation of a vision-based patient monitoring and management system in addition to standard care for adults admitted to psychiatric intensive care units in England. J Med Econ. 25(1): 1101-9. doi: https://doi.org/10.1080/13696998.2022.2120719

Date of search	16 August 2024
Concepts used	Room-based sensors, room-based monitoring, non-contact monitoring, non-visual patient safety aid, vision-based patient monitoring, Safehinge Primera Project X, Oxevision, OxeObs, mental health, inpatient

Proposed research question and evidence selection criteria (if selected)

Proposed Research question	What is the clinical and cost effectiveness of non-contact, room-based monitoring of people in inpatient mental health services?

	Inclusion criteria	Exclusion criteria
Population	People in inpatient mental health care settings	
Intervention	Non-contact, room-based sensors and monitors in addition to standard care	
Comparison/ Comparators	Standard care- regular observation and visual check at specified time intervals	
Outcome measures	Number of patient safety incidents Incident response times Patient acceptability Staff acceptability Adverse events Health related QoL Resource use Economic outcomes	

Proposed speciality	Mental and behavioural disorders