Augmented reality potential for multiagency training in domestic abuse and sexual violence

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Abstract

Background: The Domestic Abuse Plan and Strategic Direction for Sexual Assault and Abuse Services set out a stronger system, prioritising the improvement of healthcare staff's ability to identify and refer domestic abuse and sexual violence victim/survivors, as key areas for supporting workforce development.

Objective: The Microsoft HoloLens 2 is an augmented reality headset that projects holographic patients (HoloPatients) into the classroom. This evaluation explored potential uses of the HoloPatients in domestic abuse and sexual violence training, as a potential survivor-centred educational initiative.

Methods: In this qualitative feasibility study, frontline staff and community stakeholders from the domestic abuse, social care and law enforcement sectors were invited on three separate occasions (n=14, 12, 22) to a HoloLens demonstration which displayed nine patients. Participant feedback was obtained using post-evaluation surveys.

Results: Survey data was analysed thematically. The HoloPatient was described as a 'realistic', 'adjustable' tool which 'creates a safe learning environment'. Uses include 'pre-exposure preparation' by 'improving communication' with the use of victim/survivor scripts. Identified as a suitable tool for workers inside and outside healthcare, including social care and law enforcement.

Conclusions: The HoloPatient acts as a low risk, adaptable tool, feasible for trainees to develop skills in a safe environment. This study demonstrates that professionals perceived the HoloLens as an innovative means to amplify the lived experience voice. Further research will evaluate this additional impact on trainees' confidence and responses to victim/survivors disclosing domestic abuse and sexual violence within different disciplines, to drive improved outcomes.

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Original Manuscript

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ABSTRACT

Objective:

The Domestic Abuse Plan[1] and Strategic Direction for Sexual Assault and Abuse Services[2] set out a stronger system, prioritising the improvement of healthcare staff's ability to identify and refer domestic abuse and sexual violence victim/survivors, as key areas for supporting workforce development.

The Microsoft HoloLens2 is an augmented reality headset that projects holographic patients (HoloPatients) into the classroom. This study explored potential uses of the HoloPatients in domestic abuse and sexual violence training, as a potential survivor-centred educational initiative.

Methods:

Frontline staff and community stakeholders from the domestic abuse, social care and law enforcement sectors were invited on three separate occasions (n=14, 12, 22) to a HoloLens demonstration which displayed nine patients. Post-evaluation survey qualitative data are presented.

Results:

Thematic analysis described the HoloPatient as a ‘realistic’, 'adjustable’ tool which ‘creates a safe learning environment’. Uses include ‘pre-exposure preparation’ by ‘improving communication’ with the use of victim/survivor scripts. Identified as a suitable tool for workers inside and outside healthcare, including social care and law enforcement.

Conclusion:

The HoloPatient acts as a low risk, adaptable tool for trainees to develop skills in a safe environment. This study demonstrates that professionals perceived the HoloLens as an innovative means to amplify the lived experience voice.
Further research will evaluate this additional impact on trainees’ confidence and responses to victim/survivors disclosing domestic abuse and sexual violence within different disciplines, to drive improved outcomes.

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INTRODUCTION

In the UK it is estimated that nearly 16.6% of adults aged 16 and over have experienced sexual assault (1). That is nearly double the number of patients currently living with type 2 diabetes mellitus according a national survey conducted in 2022 (2). However, unlike other medical conditions, there is little evidence discussing the pathogenesis behind domestic abuse and sexual assault, thereby making prevention programmes, both difficult to design and sustainably fund. With one of the highest rates of repeat victimisation than any other crime (3), domestic abuse affects one in five adults during their lifetime (4). Therefore early identification and intervention are key to support and protect potential victim/survivors that may present to healthcare services.

According to the UK Government, all behaviours, inflicted on anyone, perceived to be of a controlling, coercive, harmful, or sexual nature can be defined as domestic abuse or sexual violence (5). Data suggests that a majority of victim/survivors are female, with approximately 20% identifying as disabled, black, Asian, minority ethnic, lesbian, gay, bisexual or trans (6). Unfortunately, it is estimated that only a quarter of these victim/survivors report their experience to the police (7). These statistics outline the need for services to adopt a survivor-centred approach. Strategic partnerships consulting victim/survivors of all protected characteristics, are needed to enable the development of pathways specifically designed to address their psychosocial needs. This is outlined in The Strategic Direction for Sexual Assault and Abuse Services, urging local authorities, health services and strategic partners in the voluntary and community sectors to collaborate, as part of a multi-agency care model (8).

The Domestic Abuse team at Chelsea & Westminster Hospital NHS Foundation Trust, adopt a 'whole health' approach by pioneering a longstanding partnership between healthcare and community stakeholders (9), widely accepted as a best response in acute health. Their model centres on three key features: a co-located Domestic Abuse Co-ordinator responsible for training workers in domestic abuse; the co-location of Independent Domestic Violence Advisors (IDVAs) to provide holistic and specialist support to victim/survivors that are identified and a Domestic Abuse Lead. Data suggests that victim/survivors 'felt safe' and were more likely to report to an on-site IDVA whilst in hospital (10). Early identification of potential victim/survivors by frontline workers is essential and stresses the importance of high-quality in-house training on the identification, management and referral of victim/survivors of domestic abuse and sexual violence.

INTERVENTION

The Microsoft HoloLens2 is a mixed reality headset which has transformed various industries over the past few years. The healthcare industry in particular, has deployed this technology in both a clinical and educational setting. Dissimilar to virtual reality, the headset is only part-immersive as it displays augmented contents superimposed on the real surrounding environment. Organisations like GiGXR have created a series of augmented holograms, known as HoloPatients, that resemble clinically unwell patients. The HoloPatient menu listed 17 holograms, each representing a clinical emergency. Two of which were specifically designed to portray a victim/survivor of domestic abuse (Lydia Johnson) and sexual violence (Jenny Li). Each case consists of a series of video clips which depict the patient at different stages of their hospital journey (*Fig. 1.)*. Aside from Jenny Li who vocalises her experience via a pre-recorded audio clip, all other holograms are non-verbal. As a result, the user has the flexibility to adapt the HoloPatient by overlaying a different pa-

tient script to suit their educational needs. This application, if used effectively, could expose students to unique training opportunities that are ethically challenging and difficult to recreate in a real clinical environment.

In collaboration with the Undergraduate Education Team at Chelsea and Westminster Hospital NHS Foundation Trust, the Domestic Abuse team proposed the use of the HoloPatient as a tool to channel the victim/survivor voice whilst training frontline staff to identify victim/survivors of domestic abuse and sexual violence. The aim of this evaluation was to review the Microsoft HoloLens' potential as an additional learning adjunct to promote survivor-centred training in a safe setting.

METHODS

A formative evaluation of the HoloPatient as a training tool was conducted in the form of live demonstrations. Frontline staff and community stakeholders from the domestic abuse, social care and law enforcement sectors were invited to three HoloPatient events at the Trust. Following a brief introduction into augmented reality, attendees were shown data which evidenced the HoloPatient as an immersive tool when trialed in an undergraduate setting (11). The HoloLens was ultimately proposed as a teaching adjunct to be used whilst training frontline workers on the management of domestic abuse and sexual violence cases. It was envisaged to be a visual aid which amplified the lived experience, to be used after their initial training with the Domestic Abuse Co-ordinator. The patient voice was to be outlined by personalised scripts, co-created alongside sector charities ensuring victim/survivor engagement and participation. Nine HoloPatients, different in gender, age, and ethnicity, were projected into the room *(Fig. 2.)*. Participants were given the opportunity to wear the headset and familiarise themselves with the technology during the sessions.

An evaluative research model was used to explore the feasibility and functionality of the HoloPatient as an educational tool within domestic abuse and sexual violence training. Furthermore, it evaluated the potential for a centralised multi-agency augmented reality hub for professionals to access educational opportunities in the future.

Data was collected in the form of a standardised questionnaire to improve reliability. It consisted of Likert-scaling (12) and open-ended questions to collect quantitative and qualitative data, respectively. All attendees provided written informed consent to participate in this evaluation. A basic analysis conducted on the Likert scale questions displayed statistical means and modes. The qualitative data was thematically analysed using Braun and Clark's six-step method (13). One researcher (medically qualified) read each survey repeatedly to gain familiarity. Initial interpretations were dis-

cussed with the project supervisor and together they extracted evidence from the surveys to refine each theme. Finally, a list of themes were presented with illustrative examples on multiple occasions to the wider team (see example coding tree in *Fig. 3.).* As a final checking step, draft findings were discussed with a few participants prior to publication.

RESULTS:

A total of 48 questionnaires were collected across all three demonstrations (n=14, 12, 22). Only 29% of the sample were local healthcare professionals. The latter consisted of representatives from community charities, local councils, health-care electives and law enforcement *(Fig. 4.)*. No participants refused to participate or dropped out.

Themes identified when analysing participants' perspectives of the HoloPatient as a training tool in domestic abuse and sexual violence sectors were divided into three overarching questions:

- Why should the HoloPatient be used?
- What should the HoloPatient be used for?
- Who should use the HoloPatient?

A summary of this section is displayed in the table below *(Fig. 5).*

1) Why should the HoloPatient be used?

Realistic. Many attendees found the HoloPatient 'disturbingly realistic' and were impressed with how 'impactful' it was. Attendees found that the HoloPatient 'increased their sense of reality' hence improving engagement and 'retention of learning'. One participant found the HoloPatient 'more realistic than role-play' as dynamics could be affected if a trainee is familiar with their actor/mentor.

Creates a safe learning environment. Participants felt the HoloPatient brought 'real life learning experiences into a safe environment', where both trainees and victim/survivors are better protected. In contrast to role-play, trainees can repeatedly interact, make errors, stumble, and openly discuss the HoloPatient's case with peers without risk of re-traumatisation'.

Adaptable. Attendees acknowledged that the HoloPatient allows 'real life experiences to be manipulated' by using 'scenarios adapted to each trainee's requirement'. As a result, a majority of participants saw it as a tool 'helpful for all professionals'. HoloPatient demonstrations were live-streamed via Microsoft Teams to remote participants. One participant called this feature a 'key benefit' which added 'scope to scale up'.

Channel the victim/survivor voice. The concept of the victim/survivor script was presented to all participants at the HoloLens demonstrations. The scripts received positive feedback with stakeholders seeing it as an 'essential' feature that could 'bring the victim/survivor into the learning space'. The idea was to overlay the HoloPatient scenario with a voice-over, either pre-recorded or delivered by a victim/survivor facilitator on the day. Participants particularly encouraged the use of the facilitator's voice 'to ensure that nuance isn't lost'. The potential to create scripts that cover 'common scenarios in different clinical settings (e.g.: Emergency Department, sexual health)' and 'diverse cases' with different protected characteristics were discussed. The idea to 'incorporate language and cultural specific aspects' into the scripts were strongly considered. Attendees agreed with the 'inclusion of victim/survivors when creating the stories' to ensure that the scripts are 'informed by a lived experience', with agreement that 'specialist domestic abuse' input was necessary to maintain the use of trauma-informed language. The creation of 'an authentic voice advisory group' for their overall evaluation was suggested.

2) What should the HoloPatient be used for?

Pre-exposure preparation. Stakeholders saw the HoloLens as a 'safe and useful tool for practice before facing real life scenarios'. One participant described Jenny, the hologram of a sexual violence victim/survivor, as 'incredibly uncomfortable to watch' explaining that it was 'important to understand how to deal with the situation before interacting with victim/survivors'. Themes of *realism* and the HoloPatient's ability to *create a safe learning environment* were commonly mentioned in conjunction with this theme. This is something that respondents cited clinicians often do not have access to, following any training. The HoloLens offers a sandpit training tool to embed the teaching from the Domestic Abuse Co-ordinator, before practicing in real life with patients. Law enforcement similarly felt this could support junior officers responding to their first call outs in a safer space.

Identification of non-disclosing victim/survivors. The HoloPatient's potential to prepare trainees to identify victim/survivors presenting without visible injury, 'masking patients' and those 'with a hidden agenda' became a re-occurring

theme across all demonstrations. One participant described the device as ‘great for identifying behaviours or visible indicators’.

Improve communication skills.

a) *Communicating with vulnerable patients:*

Once all the HoloPatients were displayed, participants were prompted to suggest potential scenarios which could aid the identification of vulnerable victim/survivors of domestic abuse or sexual violence. Public Health England defines vulnerability as ‘in need of special care, support, or protection because of age, disability, risk of abuse or neglect’ (14). Categorised into these sub-groups, the suggested scenarios are listed below:

- Elderly patients: ‘delirium’, ‘care-home scenarios’
- Patients with mental illness: ‘suicidal tendencies’, ‘eating disorders’, ‘psychosis’
- Neurodiverse patients: ‘scenarios that include adults with learning disability’, ‘involving paid carers’
- Women: ‘pregnant women’, ‘female genital mutilation’
- Young people: ‘whole family scenarios’, ‘involving teachers’, ‘preparing families for court proceedings’, ‘forced marriage’, ‘substance abuse’
- NHS staff or other staff

b) *Communicating with LGBTQ+ victim/survivors:*

Participants stated that ‘generalist staff have not always got the skills to deal with LGBTQ+ victim/survivors’. In response, they suggested the potential use of the HoloPatient to ‘look at undermining bias in how people are assessed in regards to their gender identity and sexual orientation’. They saw how this device could support exploration of ‘intimate partner violence’ and ‘hate crime’ by editing the scenarios to have an ‘LGBTQ+ lived experience voice’.

A few participants highlighted the absence of any transgender HoloPatients.

c) *Dealing with perpetrators*:

In the first stakeholder meeting a scenario was adapted to include a perpetrator by getting a facilitator to interact with the

HoloPatient by standing in the background. They are visible to the HoloLens user and all participants watching the live-stream. It was suggested that the scenario could be adapted to 'challenge the stereotype of a passive victim/survivor' where the victim/survivor is 'aggressive and protective of the perpetrator'. A stakeholder saw its training potential within the police force, 'specifically on how to approach a victim/survivor and respond appropriately with a perpetrator present'. However, concerns with safety were highlighted. One participant stated that 'we need to be clear on the expectation around engaging with a perpetrator and how to do it safely if at all'. This was seen as a key advantage of the HoloLens tool, as this could be explored in a safe space.

d) *Re-creating difficult conversations:*

Stakeholders listed 'practicing mental capacity assessments, decision making, end-of-life care planning, dealing with confrontation and bullying and harassment cases' as challenging scenarios that could be practised with the HoloLens. One participant suggested to display 'an example of an incorrect way to deal with a situation' as a teaching tool to encourage 'open discussion'.

3) Who should use the HoloPatient?

Within healthcare.

a) Undergraduate education

When asked where this technology could be most useful, 19% of participants suggested its use in undergraduate education. In particular, 'medical and nursing students'. One attendee suggested using the HoloLens for accreditation by training 'first with the HoloPatient and then a certificate before the real practice'.

b) Maternity

At least one participant per demonstration acknowledged its need in midwifery due to 'the risk of domestic abuse during pregnancy and the trust building that happens between patient and midwife'. Additional attendees saw potential for the HoloPatient to be used in 'IDVA training', indicating it could significantly reduce the time taken to train if this were used in routine practice. Independent Domestic Violence Advisers (IDVAs) are trained specialists that work with clients 'from the point of crisis to assess, discuss and develop safety plans' (15).

c) Other frontline staff

Attendees felt as though the technology was suitable for ‘all health professionals who may come into contact with a victim/survivor’. 'No them and us,’ was stated by one participant. Particular attention was given to primary care, emergency, and sexual health service staff. Other scoping included targeting ‘third sector professionals who intend to deliver interventions on the ground’. One participant stated that training ‘could be in real-time with the holograms’, providing clinicians with ‘authentic role-play’ that was ‘less intrusive than real patients’. This is a unique concept when compared to existing training programmes, that mainly consist of online modules at a beginner level (16).

Outside of healthcare.

a) Social care sector

At all three demonstrations over one third (34%) of attendees named social workers, paid carers, and other care home staff as members of the public who would benefit from domestic abuse and sexual violence training with the HoloLens.

b) Public sector

Similarly, 32% of participants described the HoloPatient’s potential to train staff within law enforcement. Particularly those who ‘attend a domestic abuse emergency’.

The use of the technology in the Home Office was discussed, especially to recreate cases involving ‘minority ethnic victim/survivors’, ‘honour-based abuse’ and ‘modern slavery’.

LIMITATIONS:

Device limitations:

a) Wireless internet connectivity

One attendee stated that the HoloLens is a ‘useful tool when in a Wi-Fi range’. To open the HoloPatient application on the Microsoft HoloLens headset, the device must be connected to a high-speed wireless network. This is a key limitation as internet connectivity is not reliable, especially in the community. To overcome this, the Undergraduate Education Team at Chelsea and Westminster Hospital have used the smart-phone ‘Wi-Fi hot-spot’ feature to supply a mobile connection.

b) Battery life

Microsoft estimate the HoloLens' battery life to have 2-3 hours of active use (17). As both the Microsoft Teams and GiGXR HoloPatient applications were open during the demonstrations it caused the device to malfunction at approximately 1.5 hours. This was highlighted as 'an issue' by participants. One user felt that it hindered their ability to 'maximise opportunity when using it in the training room'. Microsoft have stated that the devices are fully functional whilst charging (17). Therefore, the Undergraduate Education Team inserted a portable battery pack into the USB-C port to prolong battery life during the demonstrations.

Despite these technological limitations, a majority of participants felt as though it did not affect their opinion of the HoloLens *(Fig. 6.).*

Application limitations:

a) Lack of diversity

Most participants (57%) stated that they would have liked a wider variety of 'visible clues' to represent intersectional characters (18). For example, 'different ethnicities, cultural headwear, visible disabilities, walking aids, transgender patients, pregnant women and children'. Unfortunately, this would require the HoloPatient menu to be re-designed, at significant cost which remains a limiting factor when considering scalability.

However, augmented reality allows the hologram's background to be adjusted to the user's preference therefore walking aids and other visual accessories can be added, in an alternative manner or with a real-life person in the scenario, either as a friend, a family member or a perpetrator.

DISCUSSION:

The findings of this stakeholder evaluation indicate that despite minor technological limitations, stakeholders saw the Microsoft HoloLens 2 as a novel and effective tool to deliver training on domestic abuse and sexual violence, within health, social care, law enforcement and specialist settings. The data encourages the use of co-created victim/survivor scripts alongside the HoloPatients, to create a training programme that amplifies their voice and lived experience. This technology has the potential to educate professionals on the use of trauma-informed language, whilst challenging pre-conceived assumptions around protected characteristics in safe settings.

Our future research will evaluate this tool or similar technologies for training health, social care, specialist and law en-

forcement workers around domestic abuse and sexual violence, in collaboration with community stakeholders. It could be of additional direct benefit to employee relation team training around sexual misconduct following the release of NHS England's sexual safety organisational charter (19). The goal will be to roll-out augmented reality Holovictim/survivors as a standard teaching tool, in addition to Domestic Abuse Co-ordinators, supporting the best multi-agency team public-health response to domestic abuse and sexual violence in the UK.

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Author contributions:

Conceptualisation: D.K, J.W, A.M, K.D, B.B, N.K, C.C. Methodology: D.K, A.M, K.D, B.B, C.C. Software: GiGXR, Microsoft Corporation. Validation: D.K, B.B, C.C. Formal analysis: D.K, C.C. Investigation: D.K, J.W, A.M, K.D, B.B, N.K, C.C. Resources: D.K, J.W, A.M, K.D, B.B, N.K, C.C. Writing – Original Draft: D.K, C.C. Writing – Review & Editing: D.K, C.C. Visualization: D.K, C.C. Supervision: C.C. Project administration: D.K, C.C.

Declaration of conflicting interests

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Ethical statement

This evaluation was approved by the research and quality improvement board of Chelsea and Westminster Hospital NHS Foundation Trust. Authors ensured that the planning, conduct, and reporting of this evaluation are in accordance with the Helsinki Declaration as revised in 2013.

All information within the article is the original work of the authors. The authors of the paper approve of this submission and have not previously published this paper elsewhere.

Data availability

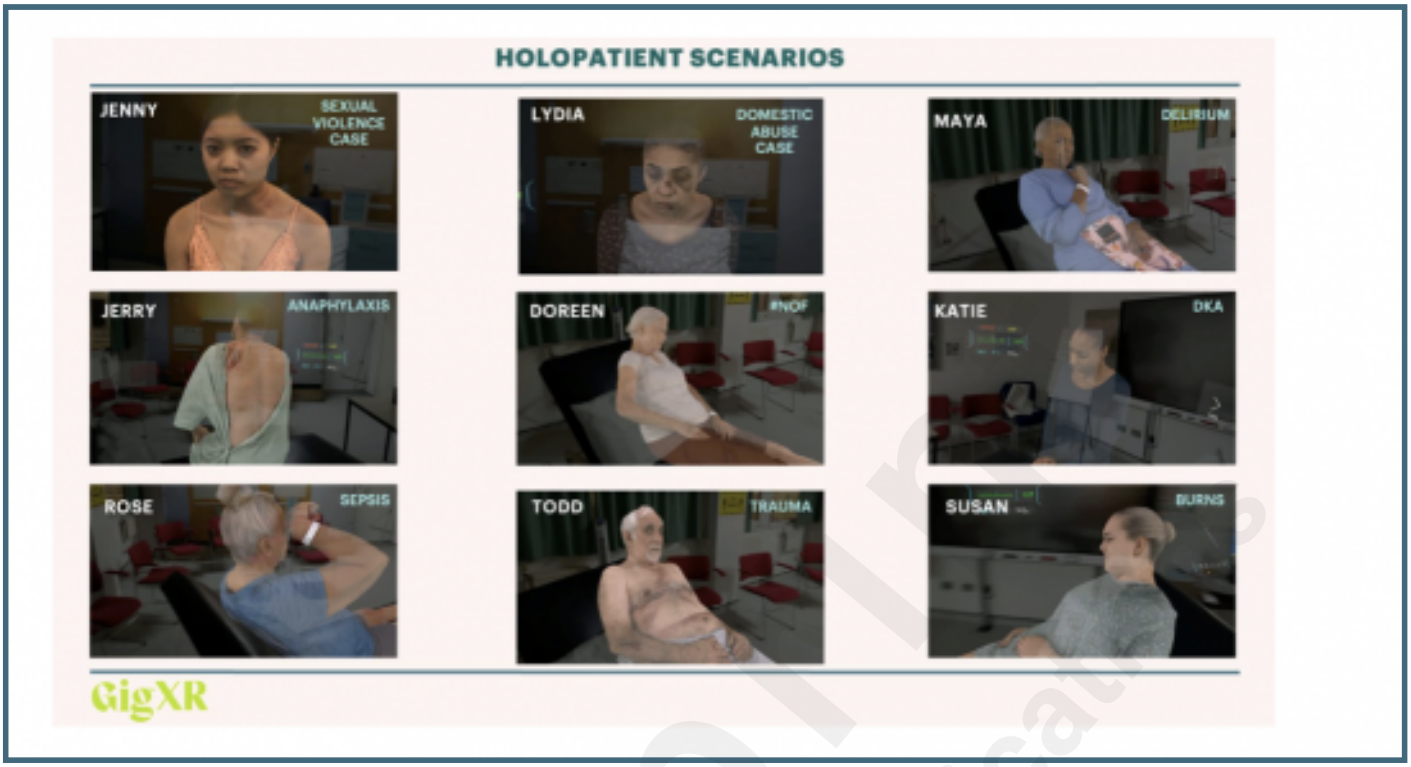
The data that support the findings of this study are available from the corresponding author upon reasonable request.

Supplementary Files

Figures

A - Initial presentation in the Emergency Department.B - On the ward as an inpatient.

Nine HoloPatients displayed during demonstrations.



Multimedia Appendixes

Coding tree.
URL: http://asset.jmir.pub/assets/315402881a1b299ff53da575781aa921.pdf

Spider diagram displaying range of attendees.
URL: http://asset.jmir.pub/assets/d7a089a93cdbb38a078037e3edb0b022.pdf

Summary of themes.
URL: http://asset.jmir.pub/assets/a690351f09a6e07ed57ea4db4a4bfb26.pdf

Pie chart depicting participants' opinion on technological limitations.
URL: http://asset.jmir.pub/assets/8e9adc78d2fbccff4e136169929bc607.pdf

CONSORT (or other) checklists

COREQ checklist.
URL: http://asset.jmir.pub/assets/6349fba60b18a14f154c8a377bb1c640.pdf