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Co-Design in the Adaptation of a Clinical Decision Support System to Aid Violence Risk Assessment and Management: A Case Study

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ABSTRACT

Introduction: The electronic application of a clinical decision support system (CDSS) conjoining the Dynamic Appraisal of Situational Aggression and the Aggression Prevention Protocol has been shown to be effective in reducing coercion and workplace violence in forensic settings in Australia. However, there is currently a lack of knowledge on the successful implementation of CDSSs across different cultural environments.

Aim: To describe the use of co-design in the adaptation of a CDSS, the eDASA+APP-FI in Finland.

Method: This qualitative case study followed a co-design framework involving a variety of methods, including analysing project data, rapid ethnography, and analysing the notes from co-design workshops.

Results: The adaptation of the CDSS into the local context included changes to the training programme and in the frequency of use of the CDSS, as well as linguistic adjustment.

Discussion: The co-design framework was valuable in identifying adaptation needs and in providing a sense of ownership among staff and consumers.

Limitations: Co-design can be time-consuming in clinical environments.

Implications: The results emphasise the importance of co-design in the identification of adaptation needs as part of the implementation process of a CDSS.

Recommendations: Co-design can be used as a framework when aiming to create a feasible CDSS.

Trial Registration: NCT anonymised.

Minna J. Anttila and Maria K. Ameel are joint first authors, and contributed equally for this work.

Summary

- What is known on the subject?
- Clinical decision support systems (CDSSs) can aid nurses in making decisions based on evidence in their everyday work.
- Cross-cultural implementations of CDSS are seldom reported.
- Using a CDSS in short-term violence risk assessment and management may help reduce violence and the use of restrictive practices in mental health inpatient units.
- Originality
- To minimise feasibility challenges, the implementation of a CDSS should begin with the identification of local adaptation needs.
- Co-design, originally developed for intervention development, is a useful method for understanding end-user needs when implementing a locally adapted CDSS.
- Co-design can be time- and resource-intensive when conducted in real-world settings.
- Significance
- As the implementation of CDSS across cultures becomes more common, specific cultural and contextual factors should be considered.
- The perspectives of mental health nurses and experts-by-experience are needed in every step of transforming evidence into practice.
- Strong organisational support and the active involvement of key stakeholders are important.

1 | Introduction

Clinical decision support systems (CDSSs) can support nurses in making evidence-based care decisions (Sutton et al. 2020). However, there is a lack of clarity on the effects that CDSSs have in nursing practices, and research reporting on detailed implementation strategies is needed (Mebrahtu et al. 2021). When applying a CDSS to the local workflow of a specific culture, identifying the adaptation needs is crucial (Chen et al. 2023). Implementing a CDSS within healthcare settings is often challenging; according to a review on the effects of CDSS on nursing and allied health professionals, the implementation strategy is seldom reported (Mebrahtu et al. 2021). Co-design is one strategy option that can be used in the implementation of digital services (Nusir and Rekik 2022). Co-design is based on end-user engagement (Slattery et al. 2020) and collaboration (Grindell et al. 2022). The co-design approach prioritises collaborative decision-making and the solicitation of knowledge from professionals and experts-by-experience (Tindall et al. 2021), which benefits all users (Grindell et al. 2022; Slattery et al. 2020).

This paper describes a case study on the use of co-design in the adaptation of a CDSS, the electronic Dynamic Appraisal of Situational Aggression and Aggression Prevention Protocol (eDASA+APP). The eDASA+APP is an electronic application, developed and tested in Australia. It incorporates the Dynamic Appraisal of Situational Aggression (DASA) (Ogloff and Daffern 2006) and the Aggression Prevention Protocol (APP) (Maguire et al. 2019). DASA is a short-term seven-item violence risk assessment measure with strong predictive validity for imminent violence (Ogloff and Daffern 2006). The APP (see Table 1) includes evidence-based interventions designed to prevent violence. Each DASA risk band (Low, Moderate and High) has specified nursing interventions including one-to-one nursing, reassurance, distraction, de-escalation, limit setting, PRN (pro re nata) medication, and increased observations (Maguire et al. 2019). The use of the eDASA+APP in forensic mental health units is associated with reductions in aggression and in the use of restrictive interventions (Griffith et al. 2021; Maguire et al. 2019).

2 | Background

Violence in mental health inpatient units is a major problem globally. According to guidelines by the National Institute for Health and Care Excellence (NICE), violence can refer to a range of behaviours or actions that can result in harm, hurt, or injury to another person, regardless of whether the violence is physically or verbally expressed, if physical harm is sustained, or if the intention is clear (NICE 2015). Violence can be influenced by intrinsic factors, including personality characteristics and intense mental distress, or extrinsic factors, for example attitudes and behaviours of staff and consumers, physical settings, and restrictions that limit liberties (NICE 2015). Most instances of violence in mental health inpatient units (52%–81%) manifest verbally (Sahebi et al. 2022), especially during or after restrictive interventions (Muir-Cochrane et al. 2018).

Nurses often rely on restrictive interventions and coercive practices to prevent and manage violence (Herrman et al. 2022). However, these risky activities can exacerbate violence and cause both physical and psychological harm to staff and consumers (Varpula et al. 2022). Thus, it is important to prevent violence by intervening early and limiting the use of restrictive interventions when possible (Wilson et al. 2017). It is also crucial to work with the consumer to develop a safety plan; this can, for example, alert staff to potential triggers to violence (Maguire et al. 2021).

Violence risk assessment is a precondition for the effective prevention and management of violence (NICE 2015). Multiple methods are used to appraise risk. Two instruments for risk assessment, the Brøset Violence Checklist (BVC) and DASA, are included in NICE's (2015) guidelines for the short-term management of violence and aggression in mental health, health and community settings. However, risk assessment alone does not prevent violence; assessment must be accompanied by nursing interventions, preferably before violent situations escalate (Griffith et al. 2021).

In this study, a survey indicated that nurses were unsure whether validated instruments were effective in identifying consumers at risk for violence (Varpula et al. 2024). The element of scepticism found here reflects observations made in other

TABLE 1 | DASA risk band, APP intervention method and the focus of the method (based on Maguire et al. 2021).

DASA risk band and violence risk management suggested method	Focus of the method
Low risk DASA band	
One-to-one nursing: • Therapeutic communication. • Reading over documents such as personal safety plans, or sensory modulation plans.	Time spent one-to-one with the purpose of therapeutically engaging the person to explore their thoughts and feelings, and actively listen to what they are saying
Reassurance: • The tone, rate and volume of voice. • The distance between the nurse and the consumer. • Nurses posture eye contact and facial expressions	The pragmatic use of communication skills to calm anxiety, promote comfort, shape beliefs and promote motivation
Distraction techniques • Listening to music. • Watching television. • Reading. • Exercising. • Having a hot shower. • Art work	Strategies that are used to attempt to calm, distract, manage and minimise distress
Moderate risk DASA band	
De-escalation: • Delimit (ensure safety). • Clarify. • Resolve. • Control oneself. • Respect and empathise	A complex, interactive process using Talk Down methods in which a person is redirected toward a calmer personal space
High risk DASA band	
Limit setting: • Understanding the consumer's needs and perspective. • Fairness and respect. • Knowing and engaging. • Consistent limits	A method aimed at establishing the boundaries of what is and what is not acceptable behaviour, an attempt to change disturbing, unsafe, or destructive behaviour, or to engage the consumer in further treatment
PRN medication	The use of pharmacological treatment to address symptoms that may lead to violence and aggression
Increased observations, based on: • Clinical need. • Assessed risk. • Patient behaviour. • State of mind. • Environmental issues	Ensures close monitoring and engagement

international studies on nurses' experiences of risk assessment (O'Dowd et al. 2023). The eDASA+APP has the potential to be more useful than previously used instruments for mental health nurses since it guides intervention selection following a risk assessment. However, given that the eDASA+APP was developed in Australia, introducing an existing CDSS in different cultural contexts may pose challenges (Chen et al. 2023). Therefore, a co-design framework was used to identify adaptation needs as part of the implementation process of the eDASA+APP.

3 | The Study

The findings presented in this paper show the adaptation needs of the eDASA+APP based on a co-design process structured by O'Cathain et al. (2019) and the taxonomy of intervention development. The results describe challenges faced when using co-design in real-world settings and the ways of addressing these challenges. This case study gives a realistic example of a systematic co-design process that can be utilised when implementing a CDSS in various cultural contexts.

The research questions were: (1) How was a co-design framework implemented in the adaptation process of the eDASA+APP-FI? (2) Which adaptation needs were identified in the original eDASA+APP?

This paper is part of a larger research project concerning the implementation of the eDASA+APP in Finnish mental health units and the short- and long-term impact of the intervention (NCT anonymised).

4 | Methods

4.1 | Study Design

A qualitative case-study design (Crowe et al. 2011) was chosen to describe the use of co-design in the implementation of the eDASA+APP in Finland, resulting in the eDASA+APP-FI (FI = Finland). According to Crowe et al. (2011), a case-study design is particularly helpful when the focus of the study is on implementation in real-world settings. The case-study aims

to describe a specific case in its local context and, through the use of multiple methods, bring insight into the phenomenon (Crowe et al. 2011). The study is reported using the Standards for Reporting Qualitative Research guideline (O'Brien et al. 2014).

4.2 | Co-Design

The co-design framework emphasises equality in decision-making between researchers and the people the intervention targets (O'Cathain et al. 2019). In health care, co-design has emphasised patients' experience in the centre of the design process (including service design), highlighting the participation of end-users throughout the design process (Bate and Robert 2006). O'Cathain et al. (2019) have established six steps for co-design-based intervention development: (1) identify and build an initial team that includes end-users and people important to the service, (2) define and understand the current problem and share knowledge, experience, and skills, (3) co-create the vision by listening to all, (4) co-design a solution by being open to a range of potential solutions, (5) build the solution using the expertise of participants, and (6) integrate outcome assessments into the process that are carried out together. This paper describes the first five steps of the co-design process used with the adapted version of the CDSS.

4.3 | Study Context

The study was conducted at the (Helsinki University Hospital) Department of Psychiatry, in Finland. The hospital's catchment area included 2.2 million people. The hospital system comprised 31 mental health units located in 11 hospitals: 28 units were for adults and included acute, sub-acute, psychogeriatric, and forensic mental health units. The units had between 10 and 16 beds, and lengths of stay varied between 1 week and several months. Most patients in the non-geriatric units were suffering from psychosis. Many patients in the psychogeriatric unit had an additional neurological diagnosis. Registered nurses were the largest professional group represented in every unit, followed by vocational nurses.

There have been efforts to implement violence risk assessment instruments within the hospitals system in focus, but several challenges have hindered the sustained use of these instruments. Nurses have seen DASA as 'just another form to fill out', resulting in reliance on clinical intuition and unstructured clinical appraisal when assessing the consumers' risk for violence. Concerns have also been expressed regarding a lack of clarity on how to integrate risk assessment results into daily nursing practice (Lantta et al. 2015, 2016). At the beginning of the project, the units (or the hospital system in general) were not systematically using an instrument for violence risk assessment.

4.4 | Recruitment

Recruitment took place at three levels. First, the researchers and the nursing directors together chose three units that would represent different levels of violence risk: one unit with a high occurrence of violence (a closed psychogeriatric unit), one unit with a low occurrence of violence (a closed rehabilitation unit), and one unit with a moderate occurrence of violent incidents (a closed, acute care unit for people experiencing psychosis). A meeting with the nurse manager of each unit was organised to agree on the role of nursing staff during the adaptation process. Second, a rapid ethnography was planned with the nurse manager and nurses at one of the units. Third, two workshops were held at each unit, making a total of six broadly identical workshops. The nurse managers invited nursing staff to attend the workshops.

Information about the study was provided to the units through study leaflets and emails. Additionally, the researchers held on-site visits before the first workshop. Experts-by-experience were recruited (anonymised for review) from the organisation's research panel, which included people with lived experience of hospital care. Experts-by-experience in this panel were trained to participate in research projects.

4.5 | Data Collection

Multiple forms of data were collected, as is typical in case studies (Crowe et al. 2011). Project management data were collected, including emails, memos, and notes from the project's chat in Microsoft Teams (Between November 2020 and December 2023). Co-design methods, including rapid ethnography consisting of non-participant observations and interviews, were also used (Vindrola-Padros and Vindrola-Padros 2018) to understand the nurses' processes of documentation and violence risk assessment. This phase of the data collection was conducted by a nurse researcher working in positions outside of the participating units who had previous experience and training in ethnographic methods. The data were collected during one evening shift in May 2022 in one of the units participating in the workshops. The evening shift was chosen since it was considered less hectic and a time when nurses would have a greater chance of being able to talk with the researcher. During the shift, the researcher spent time at the nurses' station where nurses were making notes. These notes were analysed and reflected upon in the second set of workshops.

Finally, six co-design workshops were held between 17 May and 8 June 2022. The two-hour workshops were carried out as group discussions in a quiet space in the units, away from the consumer areas. Researchers (anonymised for review) facilitated these workshops, and a research assistant (anonymised for review) took field notes. The workshops took place in the units or in negotiation rooms close to units during working hours. The workshops were scheduled at times when as many interested nurses as possible would be able to participate.

A more detailed description of how the workshops were structured as well as the number of participants and their professions can be found in Appendix S1.

4.6 | Data Analysis

The first, the study data was analysed using qualitative deductive content analysis (Elo and Kyngäs 2008) to structure it according to the co-design taxonomy by O'Cathain et al. (2019). Secondly,

the data from the rapid ethnography and workshops were analysed thematically (Braun and Clarke 2006) to describe the current practices of violence risk assessment and documentation and the adaptation needs for the original CDSS. In total, the qualitative data included 42 pages of text. All members of the research team reviewed how the text was categorised into specific themes, and any disagreements about the categorisation were resolved through consensus. Themes from the first workshop and the rapid ethnography were discussed in the second round of workshops.

4.7 | Ethical Considerations

Research permission was granted by the study organisation before the introduction of the study. Ethical approval was obtained from the Ethics Committee of the (anonymised) (15.12.2021). All participants who were present in the unit during the ethnographic fieldwork and in the workshops gave informed consent. All notes were made anonymously. The voluntariness of study participation was emphasised at the beginning of each workshop.

4.8 | Rigour and Reflexivity

Along with the principles of co-design, a priority of the study was to include the views of all the participants. This was carried out through the use of various types of data collection methods as well as continuous reviewing and member checking at the workshops. The researchers who moderated the workshops and took notes had a background in psychiatric nursing and therefore were familiar with the setting. The researchers also had experience in conducting research with focus groups, which aided in their facilitation of the workshops. Two of the researchers were working in hospital settings at the time of the data collection. One held an administrative position not directly linked to the units, and the other (who also conducted the rapid ethnography) was working as a nurse in an inpatient unit located in a different city. The experts-by-experience were recruited from the hospital district's research board and had training in participating in research. The background of the project and the aim of each workshop were explained at the beginning of each session. Findings from the first workshop were discussed in the second to ensure that the interpretations were correct. The researchers aimed to maintain a safe and open atmosphere, and the importance of sharing everyday clinical knowledge was emphasised several times. The researchers encouraged the participants to share their views both through open discussions and by asking them to anonymously write their thoughts on sticky notes.

5 | Findings

The findings of the co-design process are presented according to the steps, from one to five, of the taxonomy by O'Cathain et al. (2019). Figure 1 presents a timeline providing an overview of the entire process. The timeline includes delays and other challenges that were faced during the adaptation process.

5.1 | Identify and Build an Initial Team Including End-Users and People Important to the Service

As participant identification is the first step of the taxonomy, three levels of participant groups were identified: academic, clinical, and administrative. The initial academic team comprised academic and clinical researchers, who first discussed implementing the CDSS in the hospital system in November 2020. The service's electronic health record (EHR) developer joined

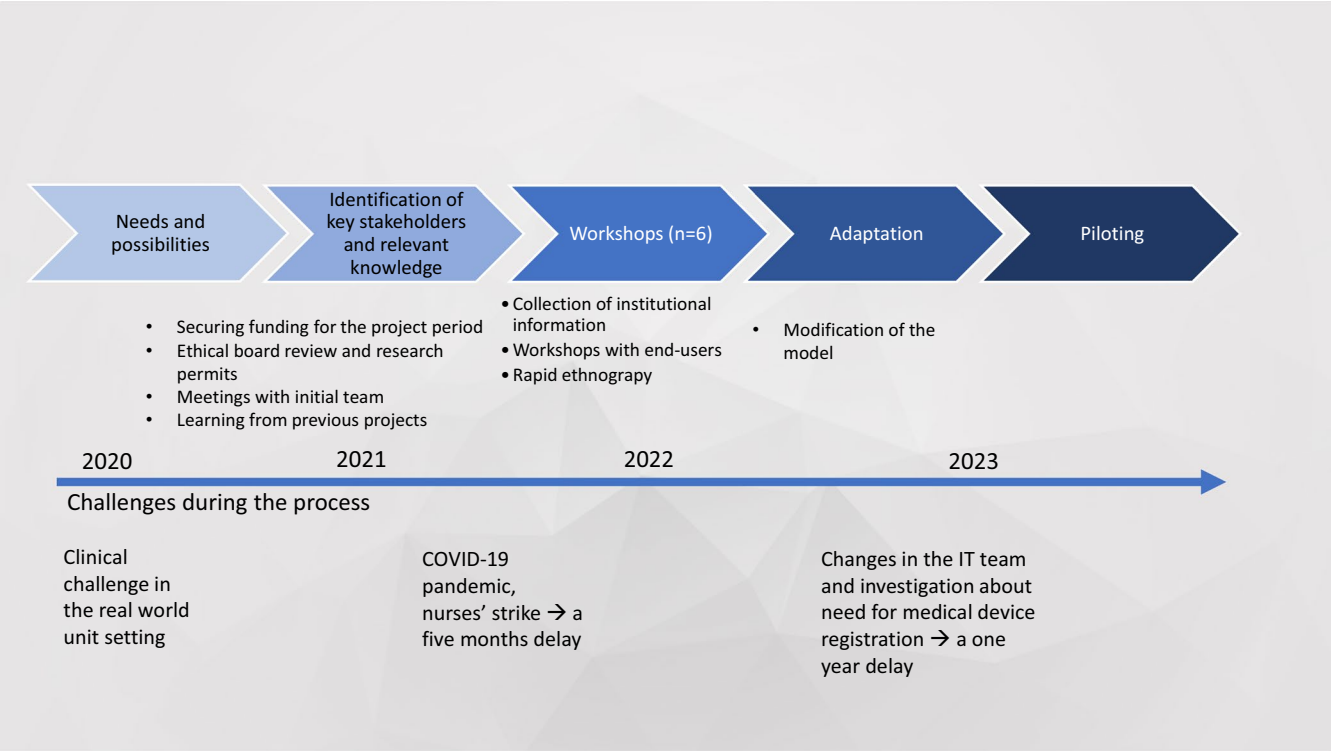

FIGURE 1 | The adaptation process with the timeline.

the team soon afterwards. As a result, the researchers working in academia, including the developers of the eDASA+APP and the hospital's chief nursing officer, decided to implement the eDASA+APP in the hospital, after adapting it to correspond to the extant practices of the local context. At this point, it was decided that it would be essential to include nurses, nurse managers, and experts-by-experience in the co-design process as they would be the end-users of the CDSS. The clinical-level participants consisted of end-users and were gathered in six workshops. The workshops were attended by six to nine end-users (staff and experts-by-experience, representing consumers), altogether 42 participants. Participants included nurses, managers (assistant unit managers and unit managers), and in five workshops an expert-by-experience (three different persons). Additionally, at one of the workshops, one nursing student and one psychologist working at the unit participated.

The administrative group consisted of additionally the quality hospitals' quality manager and occupational safety and health manager.

5.2 | Define and Understand the Current Problem and Share Knowledge, Experience and Skills

The current problem was identified at different levels. The academic research team had experienced challenges when implementing a paper version of DASA. The academic team was also identified the exclusion of nurses in the development of the EHR as being problematic.

The hospital administrative team identified the challenge of workplace violence as well as the need to provide safer care while using fewer coercive measures for consumers. Additionally, one of the goals of the hospital district was to increase collaboration between nurses and consumers through the electronic documentation process. This perspective was therefore considered, as the eDASA+APP would be most efficient when used with the consumer. The administrative team also emphasised the need to include existing practice guidelines and care models (including Safewards, [Bowers 2014], which guides nurses in aggression prevention strategies in the service) in the adaptation. As both nurses and nurse managers expressed feeling overwhelmed by new approaches, it was seen as important to incorporate the eDASA+APP into existing practices.

In the first workshop, existing methods of violence risk assessment and prevention were discussed. The themes that emerged from the discussions on existing violence assessment practices included intuition, relying on notes from previous care episodes, and talking with the consumer. The themes for prevention strategies included medication, ensuring physical safety, talking with the consumer, and anticipation. Similar themes were identified in the notes taken during the rapid ethnography. Additional themes for prevention strategies included personalisation of care plans and making adjustments to unit rules.

5.3 | Co-Create the Vision by Listening to All

To better understand the views of the nurses and the experts-by-experience, in the first workshop, the participants' expectations of the benefits and disadvantages of structured violence risk assessment in general were discussed. The participants wrote reflections on the expected benefits and barriers on sticky notes, which were placed on a board. The sticky notes were then discussed as participants were asked to think of solutions to the identified barriers.

The identified themes and sub-themes for benefits are described in Table 2.

Nurses expressed that the eDASA+APP should be used uniformly by and with all staff and consumers on the units, to produce regular consistent unit procedures. Benefits included increased interaction and creating a better working climate: 'Considering different viewpoints...it builds better team spirit'. The eDASA+APP was seen as particularly helpful for new

TABLE 2 | Themes describing potential benefits and barriers of the CDSS.

Benefits		Barriers	
Main theme	**Sub themes**	**Main theme**	**Sub themes**
Standardising care	Making it possible to identify risks and talk with colleagues systematically	Difficult to find in the EHR	Busy EHR
			The EHR is complicated to use
	A new shared care model	Lack of motivation	Pressure to fill in a new measurement
			Extra work
	New patients would be assessed systematically		Not all will be using the instrument
Helpful for new nurses	New nurses who lack experience would benefit	Stigmatising patients	Too much focus on risk for violent behaviour
Improving safety	Prevention protocol could help to prevent violent behaviour	Provocation of violent behaviour	If assessment is used with patients, could trigger aggression

employees. The need for ongoing training possibility was also discussed. It was considered important to have a short online training course available for new staff members.

Risk assessment was seen as especially important in situations when the consumer was not well known to staff, for example, during admission or the early stages of treatment or in the case of an inpatient transfer from a different unit or institution. The idea of using the eDASA+APP with a consumer was seen as a potential provocation in one of the workshops. An expert-by-experience participant took a stand, stating that, in their view, discussing the risk of violence could be helpful for the consumer.

On the other hand, there was also a concern that risk assessment would be reduced to a compulsory routine: 'Will the eDASA+APP-FI be a "necessary evil" that you just need to do...' Participants also questioned if the eDASA+APP-FI would be acknowledged by everyone (e.g., physicians) or if the results of the risk assessment would be utilised.

5.4 | Co-Design the Solution by Being Open to a Range of Potential Solutions

In the second workshop, participants were asked to categorise interventions (including the ones mentioned in the first workshops and the ones in the original APP) according to risk level and to suggest any interventions to add to the eDASA+APP that were not already included. In this latter workshop, the role of consumers in the use of the eDASA+APP was also discussed.

One main theme that emerged was that the CDSS should be available when needed by being a visible measure that is concretely in sight of the EHR system: 'If it is not in your sight in, it will likely be forgotten'. Nurses described that the existing EHR system was crowded with data and that assessment instruments were difficult to locate in the system, making assessments challenging to implement. Consumer preferences should also be included more clearly. Another need was to ensure that the assessment results would be visible to other professionals, besides nurses, in the EHR system who could benefit from them (e.g., physicians) in understanding the situation. This was seen as an important feature as violence risk assessment and management should not be just a nursing activity, but a joint multi-disciplinary effort.

To implement the eDASA+APP into the clinical workflow and EHR, participants proposed concrete suggestions for where and how the CDSS would work, including the need for single entry documentation and alerts. Participants also recommended that the CDSS should show the risk bands of the entire unit easily at one glance. They expressed that the colours in the EHR clinician interface should represent the results of the DASA risk assessment in a way that cannot be overlooked (green for low risk, yellow for moderate risk, and red for high-risk).

5.5 | Build the Solution Using the Expertise of Participants

After the second round of workshops, modifications were made to the original APP. The academic team compared the APP interventions, including new ones proposed during the workshops, to the existing Safewards interventions, adopting the same language for corresponding interventions. There was a need for linguistic modifications as well as for changes due to differences in practice contexts. First, the original APP includes the intervention of 'one-to-one nursing' at both low- and moderate-risk bands. Participants in the workshops expressed that 'one-to-one nursing' occurs alongside other interventions but that it was difficult to define in practice. Therefore, 'one-to-one nursing' was recommended for use alongside other interventions in low- and moderate-risk bands Further, participants suggested that, at the low-risk band, 'one-to-one nursing' should be replaced with 'using a personalised day program' to provide a daily structure for care. Second, at the low-risk level, the term 'reassurance' was changed to 'validation'. The Finnish word used for 'reassurance' was seen as possibly having negative connotations, even humiliating, as in 'talking to a child'.

Third, 'distraction techniques' were re-named as 'guiding the use of calming-down methods' to more precisely describe the interventions in place. Fourth, at the suggestion of the nurses, 'assuring the safety of the environment' was added as an intervention. It was seen as essential that a moderate-risk band environment would not provoke an increase in the risk of harming others with objects. Additionally, a new intervention, 'continuous therapeutic presence' was added to the high-risk band as this was practice was described as being used in situations that were perceived as high risk.

The identified adaptation needs were discussed with the initial developers of the eDASA+APP. The developers were open to modifications and understood the need for both changing intervention names and adding new interventions.

Recognising that the use of CDSS requires training, participants in the second workshop were asked to share their views on feasible training. As a result, the original eDASA+APP training was turned into an online training module, and the duration of the training course was reduced to 30 min to provide the possibility for all nurses to attend.

The solution consisted of changes made in the APP part of the CDSS and in defining integration needs for the CDSS. Table 3 describes the changes made to the original APP, and Table 4 describes the changes made in the EHR interphase.

6 | Discussion

This paper presents the co-design process in the adaptation of a CDSS, the eDASA+APP-FI. Seemingly, this is the first paper to describe a co-design process as part of identifying the local adaptation needs when implementing a CDSS directed at nurses, developed and tested in a different setting. The major adaptation needs relate to aligning the preventative interventions with existing organisational culture and practice and to changing the training curriculum to an eLearning format.

We used a co-design framework originally for intervention development. Our findings emphasise the framework's usefulness in the adaptation process. At the same time, the findings

TABLE 3 | Adaptation changes in the APP.

Original intervention	Locally adapted version
One-to one nursing	Using personalised day program
Reassurance	Validation
Distraction Techniques	Guiding the use of calm down methods
De-escalation	De-escalation
	Assuring the safety of the environment
Limit setting	Limit setting
PRN medication	PRN medication
	Continuous therapeutic presence

TABLE 4 | Adaptation needs for the EHR.

Colours need to represent the results of the DASA risk assessment in a way that it cannot be passed without noticing and reacting (green for low risk, yellow for moderate and red for high-risk band)
Visibility of the CDSS to all clinical professionals
Risk bands of the entire unit shown easily at the same glance
Reminders for assessment

highlight that implementing a CDSS requires much more than technical changes in the EHR. The findings support the results of a recent review on barriers and facilitators in the implementation of CDSSs in hospital settings that identified five types of influence (Abell et al. 2023). Of these themes, fit with workflows, the usefulness of the output in practice, technical dependencies and design, and the contextual fit with the user's role or clinical setting (Abell et al. 2023) were similar to the themes describing barriers and possibilities and the adaptation needs identified in our study.

The challenges and delays encountered during the adaptation process ranged from specific issues such as nurses' strikes to more common occurrences such as changes in the project personnel. These challenges led to the project being extended. The continuation of the project would not have been possible without the support from organisational leaders including the Chief Nursing Officer who highlighted the need to engage not just clinical nurses and nurse managers but also nurse leadership in the implementation process. This finding confirms that nurses at all levels, including leaders, play a vital role in the implementation of evidence-based practices (Crawford et al. 2023). Our findings also highlight the need for local adaptation when implementing a CDSS. In this case, this was made possible by including original developers of the eDASA+APP in the project.

Many concerns about the implementation of the eDASA+APP FI arose from the prior experiences of risk assessment instruments and interventions. Some participants suggested that the eDASA+APP-FI would not have any benefits and/or that it would mean that they could receive too many instructions to manage in their daily clinical work. Both the expected benefits and barriers reflect the findings of a recent systematic review by O'Dowd et al. (2023) concerning staff experiences of violence risk assessment and management in forensic mental health settings. One of the central themes in the review was a staff preference for 'reliance on clinical intuition' instead of using structured instruments (O'Dowd et al. 2023), similar to the nurses in this study. Currently, the assessment of imminent risk for violence tends to be conducted in local settings based on unstructured clinical judgement (Varpula et al. 2024), which is inconsistent with the recommendations of international clinical guidelines (NICE 2015). Staff need to be able to clearly see how structured instruments such as the eDASA+APP-FI benefit their work. It has been found that perceiving the benefits of a newly implemented intervention motivates end-users to use it, which reinforces the integration and sustainability of the implementation efforts, creating a so-called 'reinforcing loop' (Jalali et al. 2019). We are hopeful that our efforts in co-designing a locally adapted version of the eDASA+APP will lead to perceptions that this new intervention has benefits and will thus lead to sustainable implementation.

One of the challenges with CDSS for nurses has been the checklist type of documentation that partly contrasts with the idea of personalised nursing (Forde-Johnston et al. 2023). In our study, participants found standardisation to be a potential benefit, but also the requirement to fill in another measurement was seen as a barrier. Nurses identified moments in the care path in which the CDSS would be the most useful, for example, in consumer care transfer situations.

A systematic review identified that training is essential in the implementation of a CDSS (Abell et al. 2023). In our case, appropriate ongoing training was seen as important for promoting the long-term feasibility of the CDSS. The findings suggest that new staff members should be trained to rate consumers' risk for violence using the eDASA (Maguire et al. 2021) and should understand how to incorporate the APP into their daily nursing practice (Maguire et al. 2023).

For the CDSS to meet the needs of the end-users and for it to be used regularly so that assessment results would be utilised, participants proposed concrete actions regarding where and how the eDASA+APP information should be located in the EHR system. Additionally, using the eDASA+APP-FI collaboratively with the service user (and collaborative documentation in general) was a new practice for most participants. If implemented successfully, alongside the eDASA+APP-FI, this could tackle the challenges of risk assessment and evaluation identified by Coffey et al. (2017) by bringing together evaluation, prevention, and service user perspectives. In their scoping review on the implementation of EHR in mental health settings, Zurynski et al. (2021) propose that co-designing software and tailoring it to fit the clinical can lead to long-term, sustained implementation. The current study takes into account the actions that the participants suggested when creating a locally adapted CDSS. This will hopefully promote the acceptability and overall feasibility of the eDASA+APP-FI among end-users.

7 | Strengths and Limitations

The main strength of this study is that the process is reported according to the co-design taxonomy. The use of different types of methods, including rapid ethnography and workshops that were attended by 42 participants, represents a variety of views from various staff and experts-by-experience. Consumer involvement in research about restrictive practices has not been a standard procedure (Brierley-Jones et al. 2022). Therefore, this study adds to this scarce knowledge base.

One of the limitations of the study is that the workshops were not audio recorded because end-users worked together and moved around during the sessions. Instead, notes were taken, and this may have resulted in missing information. We tried to minimise this by having two to three research staff members in each workshop: one or two moderating and another taking field notes. As the roles of the participants were not identified in the notes, it is difficult to determine which comments were made by staff and which were made by experts by experience. Data saturation and detailed descriptions of research procedures are common ways to assess the trustworthiness of a qualitative study. In the current study, reaching a consensus regarding the adaptation needs could be seen as reaching saturation. The Supporting Information file on the workshops (Appendix S1) is included to enhance the transparency of the process.

Common to case studies, the findings of this study may not be generalisable to other populations or settings, but the description of how the co-design process was used can provide insight into carrying out the process in many different contexts. The open description of the challenges faced during the process can be used to inform future research on the time and resources that are possibly needed for the implementation and, more specifically, the adaptation process.

8 | Conclusion

Implementing a CDSS into a clinical setting should start with an adaptation process that takes cultural and practical aspects into account. The role of nurses as end-users in the identification of adaptation needs is essential. This case study of the eDASA+APP-FI suggests that co-design is a valuable framework for engaging end-users to identify adaptation needs for a CDSS and for overcoming possible challenges regarding implementation. Both organisational and cultural aspects should be taken into account during the process. Moreover, the role of nurse leadership and organisational support is crucial as implementing co-design in real-world settings can be time- and resource-consuming.

9 | Implications

The use of co-design in the adaptation process provides a possibility to overcome implementation and feasibility barriers in integrating a CDSS into a new setting. In this study, the process led to changes in the content of the CDSS for cultural or linguistic reasons. Additionally, the training was developed into an online course to support feasibility and accessibility for new nurses. Working with people who are using the system helps ensure the practicality of the implementation. The perspectives of mental health nurses and experts-by-experience are needed in every step of transforming evidence into practice; strong organisational support is crucial.

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Disclosure

This study is among the first to describe the use of co-design in the adaptation of a clinical decision support system (CDSS) for mental health nurses. This report describes the creation of a locally adapted version of the eDASA+APP developed using a framework by O'Cathain et al. (2019) for co-design-based intervention development. It was found that, in addition to the choice of technology, cultural and linguistic contexts should be taken into account when creating a locally adapted CDSS.

Ethics Statement

Ethical approval was obtained from the Ethics Committee of the HUS Helsinki University Hospital (HUS/3421/2021).

Conflicts of Interest

Tessa Maguire and Michael Daffern are the developers of the eDASA+APP studied in this paper. Maria K. Ameel works as Development Manager at the hospital district where the study was conducted.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Appendix S1:** jpm70023-sup-0001-AppendixS1.docx.