A QUALITATIVE STUDY TO EXPLORE THE BARRIERS TO ADOPTION OF CLINICAL DECISION SUPPORT SYSTEMS (CDSS-ADOPT)

Study Protocol v1.6 (06/01/2026)

NCT number pending

Medway NHS Foundation Trust

Project Reference: 1366 / IRAS ID: 365984

Research Study Protocol

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2. Study Information and overview	
2.1 Study details	
Study title	A Qualitative Study to Explore the Barriers to Adoption of Clinical Decision Support Systems
Study classification *(i.e. Research/Service Evaluation)*	Research
Department *(Please state where the study will be conducted & the name of the departmental manager)*	Medical Education – Dr Ashike Choudhury (Director of Medical Education)
Protocol Version Number *(Please state version number e.g. 1, 2)*	1.6
Protocol Version Date *(Please date protocol)*	06/01/2025

2.2 lay overview of the project

Please provide an overview of the project in lay (non-scientific/no jargon) language. This overview should be understandable to most people.

This study will explore the barriers and facilitators influencing the use of Clinical Decision Support Systems (CDSS) among emergency department (ED) clinicians in an NHS district general hospital. The ED represents a uniquely demanding environment characterised by high patient turnover, time pressure, and complex, multidisciplinary decision-making. These conditions make it both an optimal and a challenging context for the integration of CDSS, whose potential to improve diagnostic accuracy, patient safety, and workflow efficiency.

By employing a qualitative methodology (semi-structured interviews and user persona development), this study aims to generate detailed context-specific insights into clinicians' perceptions, workflow challenges, and information needs. Unlike prior research which has often adopted quantitative or system-centric approaches, this investigation will foreground the human factors that influence CDSS adoption within frontline NHS care.

The findings are expected to inform practical, evidence-based strategies for the design and implementation of CDSS tools that better align with real-world clinical workflows. In doing so, this research will contribute to the academic understanding of CDSS adoption while offering actionable insights to support NHS digital transformation initiatives in the ED and, ultimately, across the wider hospital environment.

2.3 Background/Literature review

Please provide any relevant background information to support the research area/disease. The subtitles below are to help guide you on what is required within this section. Please include published findings, Add full reference to the Reference List (Section 11). The Knowledge and Library Services can assist with completing a literature search and horizon scan please by visiting Request a Search - Medway NHS KLS

Background

CDSS have demonstrated measurable benefits across multiple domains of hospital practice. They are associated with reductions in prescribing errors of up to 55%, improvements in adherence to evidence-based guidelines of 25–30%, and gains in diagnostic accuracy for conditions such as pneumonia and cardiovascular risk compared with clinician judgement alone[1]. Despite this evidence, adoption in everyday practice remains limited. Liberati et al. and Chen et al. highlighted persistent socio-technical barriers, including poor workflow integration, usability issues, perceived increases in workload, lack of clinician trust, and concerns about autonomy[2,3]. Research by Meunier et al. and Mebrahtu et al. further note that even within single departments, uptake varies considerably across clinician subgroups, shaped by differences in experience, confidence, and perceptions of technology[4,5].

National health policy places increasing emphasis on overcoming these barriers. The NHS 10-Year Health Plan identifies digital transformation as a central strategic priority, calling for a transition from analogue to digital working and for innovations to be embedded across care settings[6]. Similarly, the Darzi Report[7] stresses that the NHS is under unprecedented strain and identifies technology, as a crucial lever for reinvention and improvement. NHS England's recent report titled *"Supporting Clinical Decisions with Health Information Technology"* also underscores the importance of developing local evidence and implementation strategies to realise the full potential of decision support tools[8].

Whilst previous research highlight measurable benefits[1], these benefits are rarely realised in practice due to socio-technical constraints[2,3]. Moreover, as CDSS evolve from rule-based systems to AI-driven decision models, concerns around explainability, trust, and workflow integration have become even more pronounced. This underscores the importance of qualitative research that can capture how clinicians actually perceive and interact with such systems in their daily work.

Rationale:

Despite growing evidence that CDSS can improve patient safety, enhance adherence to clinical guidelines, and increase efficiency within healthcare settings[1], their adoption in emergency departments (EDs) remains inconsistent and limited. Studies have identified barriers such as poor workflow integration, usability issues, lack of trust in the system's recommendations, and perceived increases in workload[2-4]. However, much of the existing literature is either quantitative or focused on single-system evaluations, leaving a qualitative gap in understanding how these barriers manifest in the real-world context of EDs within NHS district general hospitals.

This gap is particularly significant given that EDs operate under conditions of high patient turnover, time pressure, and reliance on multi-disciplinary teams - all of which heighten the need for efficient, evidence-based decision-making. Understanding why CDSS adoption remains low among ED clinicians is therefore critical to improving clinical consistency, patient safety, and overall system efficiency. Furthermore, this aligns directly with the NHS 10-Year Plan and Darzi Report, which both prioritise digital transformation and the integration of advanced technologies into care delivery. Identifying these barriers qualitatively will help inform future implementation strategies, ensuring that CDSS tools are both usable and sustainable within the NHS context.

2.4 Aims & Objectives

• Please insert a detailed description of the objectives and the purpose of the study.
• Please include a specific statement of the primary endpoints and the secondary endpoints, if any, to be measured during the study.
Objectives must be SMART
S: Specific
M: Measurable
A: Achievable
R: Relevant
T: Time bound

To explore the barriers and facilitators experienced by emergency department clinicians in adopting and using Clinical Decision Support Systems (CDSS) in a single NHS district general hospital.

2. Methodology *Please provide information as to how the study will be conducted; to include where/how and by who the data will be collected and analysed, the proposed duration of the study etc. The subtitles below are to help guide you on what is required in this section.*

Study Design:

Cross-sectional qualitative study using semi-structured interviews.

Study Setting:

The study will be carried out in the Emergency Department (ED) of Medway Maritime Hospital.

Study Period:

Interviews carried out between 10th-31st January 2026

Study Population:

- Emergency Department (ED) clinicians in patient-facing roles who routinely use or refer to clinical guidelines, protocols, or decision support systems (CDSS) to inform patient care. This includes ED doctors of all grades (consultants, registrars, junior doctors), Advanced Clinical Practitioners (ACPs), triage and staff nurses, Physician Assistants (PAs), and Clinical Support Workers (CSWs) working in the ED of the participating hospital.

Inclusion Criteria:

- Employed by Medway NHS Foundation Trust at the time of recruitment
- Working clinically within the Emergency Department
- Clinical grade of FY1, FY2, SHO/CTF, SAS/Registrar, Consultant, Nurse, Advanced Clinical practitioner, Physician Assistant, or Clinical Support Worker
- Involved in the assessment and management of adult emergency department patients
- Have routine access to the Trust electronic patient record system (Sunrise EPR) during clinical duties
- Able to provide informed consent to participate
- Aged 18 years or older

Exclusion Criteria:

- Bank, agency, or locum staff who are not permanently or regularly employed by the department.
- Staff currently on leave, secondment, or not actively practising in the ED during the data collection period.
- Clinicians currently involved in the design, management, or evaluation of the CDSS system under study.

Sample Size Calculation:

Aim for 10-12 total interviews to achieve thematic saturation.

Sampling Method:

This study will use purposive sampling with maximum variation to ensure representation across key categories of Emergency Department clinicians who use clinical decision support systems. Participants will be selected to capture a range of roles and experiences, including Advanced Clinical Practitioners (ACPs), Physician Associates (PAs), Clinical Support Workers (CSWs), nurses, and doctors at different levels (Foundation Year 1–2, Senior House Officers, Registrars, and Consultants). Recruitment will continue until data saturation is achieved within and across these categories, anticipated at approximately one to two participants per role group.

End of Study:

The study will be considered complete once all of the following activities have been concluded:

- All planned participant interviews have been conducted or recruitment has formally ceased following achievement of data saturation
- All interview recordings have been transcribed, anonymised, and verified for accuracy
- All source audio files have been securely deleted in accordance with the data management plan
- Qualitative data analysis has been completed and final themes have been agreed
- The final study report has been completed and submitted to the sponsoring organisation (Medway NHS Foundation Trust)

At this point, no further data collection or analysis will take place, and the study will move into the data archiving phase as described in the data protection section of this protocol

Data Collection Methods

Study Instrument:

The interview schedule was developed using two key frameworks to guide development; this included:

1. The NASSS-CAT (Short) toolkit[10] (Non-adoption, Abandonment, Scale-up, Spread and Sustainability – Complexity Assessment Tool) due to its focus on the multiple domains that shape the adoption and sustained use of health technologies
2. Findings from contemporary research outlined by Newton *et al.*, on clinicians'' the acceptance and use of CDSS over time[11].

The tool has then undergone face validation by experts in Data Science, Digital Health Technologies and Research Methodology.
The interview schedule was pre-tested among clinicians working in the emergency department (excluded from study population) by the chief investigator to identify issues with clarity and coherence. Minor revisions were made following these pre-tests.

Study Implementation:

Semi-structured interviews will be audio-recorded using a secure, password-protected digital recorder. Recordings will be transcribed verbatim by the chief investigator, and all transcripts will be anonymised prior to analysis by removing identifiable details such as names, roles, or locations.

Interviews to be carried out in the library training room 1 located in the education centre of Medway Maritime Hospital.

Documents will be kept locked in a secure storage facility in the Trust. Only the chief investigator will have access to these documents. Once scanned and digitised, these paper documents will then be destroyed.

All data (audio files, transcripts, and digitised documents) will be stored securely on the institution's **encrypted OneDrive** system, accessible only to the chief investigator.

3. Analysis

4.1 Planned analysis

Data will be analysed using thematic analysis, following Braun and Clarke's six-phase approach[9] outlined below:

1. Familiarisation with the data (reading and re-reading transcripts and field notes).
2. Generating initial codes.
3. Searching for themes across the data set.
4. Reviewing themes.
5. Defining and naming themes.
6. Producing the final report.

A hybrid inductive-deductive analytic strategy will be applied; initial inductive (data-driven) coding will allow themes to emerge naturally from participants' accounts. In parallel, deductive coding will draw on the domains of the NASSS-CAT (Short) framework[10], providing a structured lens through which to interpret barriers and facilitators to CDSS adoption. The NASSS domains will be used as higher-order organisational categories to support theme development, comparison across professional groups, and interpretation of system-level influences. Reflexive memo-writing will be used throughout to ensure transparency and analytic rigour.

Coding and theme development will be carried out by the chief investigator. Reflexive notes will be maintained throughout analysis to ensure transparency and interpretive rigour. Anonymised transcripts will be coded with the help of automated coding software (NVivo) and manual coding when required.

4.2 Person performing the analysis?

Chief Investigator with the Help of the R&I Department of the Medway NHS Foundation trust

4. Risks and benefits

5.1 Risks of study participation

Participation in this study is considered low risk. The potential risks or burdens include minor inconvenience due to time commitments for interviews, and the possibility of mild emotional discomfort when discussing barriers or frustrations related to clinical decision support systems and workflow. Participation will be entirely voluntary, and individuals may withdraw at any time without penalty.

5.2 Benefits of study participation

The anticipated benefits include contributing to the improvement of CDSS design and implementation within the Emergency Department, supporting more effective and user-centred clinical workflows. The findings may also benefit other departments and healthcare organisations planning to adopt or optimise CDSS, aligning with the NHS Long Term Plan's objectives for digital transformation and data-driven clinical decision-making.

5.3 Risk Assessment performed?

Performed 10/12/2025

5. Data protection

Please describe how the data will be collected per the General Data Protection Regulation (GDPR). Include details of procedures for data handling, record keeping and archiving arrangements both during and post-study, including the location of data, accessibility rights and security provisions.

All research data will be stored in compliance with institutional and NHS data governance policies.

Signed consent forms will be scanned and stored securely in an encrypted folder on the institution's NHS OneDrive system, accessible only to the chief investigator and authorised supervisors. Physical copies will then be securely shredded.

Audio recordings of interviews will be used solely for transcription and deleted immediately after transcripts are checked for accuracy and anonymised. Anonymised interview transcripts and digitised field notes will be retained securely on the institution's encrypted NHS OneDrive system for a period of 10 years following study completion, after which they will be permanently deleted.

6. Funding

7.1 Does this project require funding?

No

7.2 Has funding been secured

N/A

7.3 Have you completed a study budget

N/A

7. Ethical considerations

Please list any factors of your project that may lead to ethical issues.

Also elaborate on

Ethics Approval:

HRA Approval pending

Informed Consent:

Participants will be given a copy of the participant information sheet with the opportunity to ask any questions. A consent form will then be signed to confirm willingness to be included in the study.

Confidentiality:

All data will be treated as strictly confidential. During transcription, any identifying information such as participant names, colleague names, or specific departmental or hospital references will be removed or replaced with pseudonyms. Participants will be assigned unique codes in the form of a participant number, and findings will be reported using generic descriptors (e.g., *"ED nurse"*, *"registrar"*, *"ACP"*) to ensure anonymity.

Only the chief and associate chief investigators/co-researchers will have access to the original recordings and identifying information, which will be securely stored and deleted after transcription and anonymisation. All outputs (reports, publications, and presentations) will present findings in aggregate form and will not include any information that could directly or indirectly identify individuals or the study site.

8. Dissemination plans

Please list all the ways you plan to share the findings of this project. This may include scientific journal publications, conference presentations etc.

The results of this study aim to be published in scientific journal publications, conference presentations, and shared with the Trust management.

9. Any other relevant information

10. Reference List

Please add in full references you have added into text in the above sections. Use Harvard referencing style (For examples see link https://www.scribbr.co.uk/referencing/harvard-style/). If your field has a selected referencing style use that one.

1. Sutton RT, Pincock D, Baumgart DC, Sadowski DC, Fedorak RN, Kroeker KI. An overview of clinical decision support systems: benefits, risks, and strategies for success. NPJ Digit Med. 2020 Feb 6;3:17. doi: 10.1038/s41746-020-0221-y. PMID: 32047862; PMCID: PMC7005290
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3. Chen W, O'Bryan CM, Gorham G, Howard K, Balasubramanya B, Coffey P, Abeyaratne A, Cass A. Barriers and enablers to implementing and using clinical decision support systems for chronic diseases: a qualitative systematic review and meta-aggregation. Implement Sci Commun. 2022 Jul 28;3(1):81. doi: 10.1186/s43058-022-00326-x. PMID: 35902894; PMCID: PMC9330991
4. Meunier PY, Raynaud C, Guimaraes E, Gueyffier F, Letrilliart L. Barriers and Facilitators to the Use of Clinical Decision Support Systems in Primary Care: A Mixed-Methods Systematic Review. Ann Fam Med. 2023 Jan-Feb;21(1):57-69. doi: 10.1370/afm.2908. PMID: 36690490; PMCID: PMC9870646
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7. Department of Health and Social Care. *Independent investigation of the NHS in England*. Published 12 September 2024, last updated 15 November 2024. Available at: https://www.gov.uk/government/publications/independent-investigation-of-the-nhs-in-england
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10. Thrive by Design (no date) *NASSS-CAT toolkit*. Available at: https://www.thrivebydesign.org.uk/our-learning/nasss-cat-toolkit (Accessed: 17/10/2025).
11. Newton, N., Bamgboje-Ayodele, A., Forsyth, R., Tariq, A. & Baysari, M. T. (2025) 'A systematic review of clinicians' acceptance and use of clinical decision support systems over time', *npj Digital Medicine*, 8, Article 309. doi: 10.1038/s41746-025-01662-7.