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Understanding and reducing how patient generated images can distort what clinicians see in remote consultations (SEE-SAFE)

Submission date 21/09/2026	**Recruitment status** Not yet recruiting	[X] Prospectively registered [_] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [X] Record updated in last year
Registration date 02/10/2026	**Overall study status** Ongoing	
Last Edited 02/10/2026	**Condition category** Other	

Plain English summary of protocol

Background and study aims

Clinicians increasingly assess patients through video calls and through photographs that patients send from their own smartphones. These images do not always show what the patient really looks like. Poor lighting, camera quality, slow internet connections, phone filters and automatic image processing can change colours and hide detail. This could lead a clinician to miss signs such as yellow eyes (jaundice), blue lips (low oxygen) or a rash. These risks may be greater for people with darker skin. At present there are no agreed minimum standards for the quality of images used in remote consultations. SEE-SAFE aims to find out how much images and video are distorted, whether this affects clinicians' decisions, what has gone wrong in real NHS incidents, and to develop practical standards and guidance with patients, clinicians, policy makers, regulators and industry.

Who can participate?

The study has three parts. In Part 1, adults living in Wales who have a confirmed diagnosis of one of four conditions that cause visible signs, who currently show those signs, and who are clinically stable, can take part. A panel of 12 clinicians (GPs and Advanced Practitioners) will also look at the images. Part 2 uses anonymised incident reports and does not recruit anyone. In Part 3, adults aged 18 or over in senior roles in policy, regulation, clinical leadership, commissioning and service delivery, industry or patient advocacy can take part in interviews and a workshop, in English or Welsh.

What does the study involve?

Part 1: participants attend one session lasting about 2 to 3 hours at an NHS outpatient department in North Wales, or are visited at home if they cannot travel. A healthcare assistant supports them and measures their oxygen level. Photographs and video are taken with a range of smartphones and tablets under different lighting conditions. The session is separate from any clinical care and does not change any treatment. Clinicians then view the images and record what they can see and how confident they are. Computer analysis measures how much the images are distorted.

Part 2: researchers will code up to 6,000 anonymised patient safety incident reports about video

consultations or shared images, held by NHS England, to describe what happened and why. Part 3: about 20 stakeholders will be interviewed once, for 45 to 60 minutes, by video call, telephone or in person. Interviewees and other invited stakeholders will then be asked to a workshop to discuss the findings and help write standards, checklists and guidance. Later meetings with organisations will help refine and test these outputs but will not be analysed as research data.

What are the possible benefits and risks of participating?
There is no direct benefit to participants, but the results should help make remote care safer and fairer. Part 1 participants can ask for a summary of the findings and are paid at the NIHR rate for their time with travel costs covered. Part 3 participants receive no payment for their time in a professional capacity; travel expenses are reimbursed. The risks are small: time, tiredness during the photography session, and possible discomfort discussing sensitive organisational issues. Participants can stop at any time. In the workshop, confidentiality cannot be guaranteed because discussion takes place in a group.

Where is the study run from?
Bangor University (North Wales Medical School), working with Cardiff University, Betsi Cadwaladr University Health Board and other partners.

When is the study starting and how long is it expected to run for?
December 2026 to September 2028.

Who is funding the study?
Health and Care Research Wales (Integrated Funding Scheme Call 5).

Who is the main contact?
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Study information

Scientific Title
SEE-SAFE: Understanding and reducing visual distortion in patient-generated image transfer and video consultations: the effect of device, lighting and software processing on clinician recognition, diagnostic agreement, confidence and triage decisions in adults with visible clinical signs; analysis of patient safety incident reports involving video consultations or shared images; and co-production of standards and guidance with system-level stakeholders

Acronym
SEE-SAFE

Study objectives
1. To define and quantify how environmental, device and software factors distort visual fidelity (WP1)
2. To assess how image distortion affects diagnostic accuracy through clinician evaluation and machine-learning analysis, establishing safe decision-making thresholds (WP1)
3. To characterise the nature of patient safety incident reports involving a video consultation, or a consultation in which images were shared with healthcare professionals (WP2)
4. To identify relationships between types of safety incident, the nature of reports (as contributory and mitigatory factors) and related harm experienced by patients (WP2, objective 2a)
5. To describe the most common and concerning patterns in those incident reports (WP2, objective 2b)
6. To translate findings from WP1 and WP2 into implementable standards and guidance for image-enabled remote care, co-produced with system-level stakeholders and positioned for adoption within NHS Wales and the wider UK health system (WP3)
7. To co-produce practical solutions: minimum image standards, clinician checklists and patient-facing guidance

Ethics approval required
Ethics approval required

Ethics approval(s)
Not yet submitted

Primary study design

Observational

Secondary study design
Cross sectional study

Study type(s)

Health condition(s) or problem(s) studied
Visual distortion of clinical images and video in remote consultations and its effect on patient safety. WP1 focuses on conditions with colour-based visible signs where we will work with our patient advisory group to identify relevant conditions.

Interventions
SEE-SAFE is a 24-month mixed-methods observational study with three linked work packages (WP), comprising (WP1) an experimental imaging study with clinician assessment of images against reference standards, (WP2) a retrospective cross-sectional analysis of anonymised patient safety incident reports, and (WP3) a qualitative study of stakeholder interviews and a deliberative workshop.

WP1: Twenty-four adults with visible signs of one of four target conditions, recruited through Wales-based patient organisations and moderated community groups, will attend a single research photography session of about 2-3 hours at an NHS outpatient department (Ysbyty Gwynedd or Penrhos Stanley, according to proximity), or at home if they cannot travel. Sessions are not part of clinical care. A healthcare assistant supports each participant and measures oxygen saturation. Images and video of each participant will be captured with a fixed clinical imaging setup carrying a colour reference, using four core smartphones under three lighting settings (controlled baseline; typical remote in daylight; typical remote under indoor warm household lighting), with additional phones and tablets used in supplementary analyses. A panel of 12 clinicians (GPs and Advanced Practitioners from North Wales GP Out of Hours services) will review the images through a secure portal, recording whether clinical signs are present, urgency or triage decision, confidence (1-5), whether image quality influenced the decision, and artefacts seen. Reference standards are laboratory results where available, expert panel consensus using baseline images, and clinical diagnosis. Objective computational measures of colour fidelity and image clarity will be compared with clinician judgements. Data will be analysed with mixed-effects models with random effects for participant and clinician. Participants have no follow-up beyond the session.

WP2: Up to 6,000 anonymised patient safety incident reports from NHS England's Learn from Patient Safety Events (LFPSE) service, covering the last 2 years will be coded by two trained academic GP registrars using the PatIent SAfety (PISA) classification system; 10% will be independently double-coded. Coded data will be cross-tabulated and a purposive sample of contributory factors mapped to the six SEIPS domains. No patients are contacted.

WP3: Approximately 20 senior stakeholders (policy, regulation, clinical leadership, commissioning and service delivery, industry, patient advocacy) will be recruited by purposive maximum-variation sampling and interviewed once for 45-60 minutes by Microsoft Teams, telephone or in person (Months 6-14). A cross-sector workshop of interviewees and additional invitees (Months 14-19) will present WP1 and WP2 findings and develop implementable standards, checklists, patient guidance and policy briefs; plenary discussion is audio-recorded. Data will be analysed using reflexive thematic analysis in NVivo.

Intervention Type
Other

Primary outcome(s)
1. WP1: Agreement between clinician assessment of the presence or absence of the clinical sign in each image or video set and the reference standard measured using kappa / Gwet's AC1 (and sensitivity and specificity), at the time of each clinician's review of the image set (single review per image set) during months 6-14

2. WP2: Distribution of incident types, contributory and mitigatory factors, and harm outcomes among included incident reports measured using the PISA classification of each report, coded once per report, at months 4-12

3. WP3: Themes describing how stakeholders interpret WP1 and WP2 evidence, acceptable risk thresholds and implementation barriers and enablers measured using a reflexive thematic analysis of interview transcripts, field notes and workshop data, analysed iteratively, at months 6-19

Key secondary outcome(s)
1. WP1: Clinician confidence in each assessment measured using a 1-5 scale at the time of review

2. WP1: Urgency or triage decision measured using recording performed by each reviewing clinician at the time of review

3. WP1: Whether image quality influenced the clinician's decision, and which artefacts were observed (for example colour distortion, blur, compression blockiness), measured using a recording by structured assessment guide at the time of review

4. WP1: Objective measures of colour fidelity and image clarity measured using computational methods at during WP1

5. WP2: Frequent relationships between incident type, contributory factors and outcomes measured using cross-tabulation of PISA codes and contributory factors mapped to the six SEIPS domains for a purposive sample, at during WP2

Completion date
30/10/2028

Eligibility

Key inclusion criteria
WP1 (patient participants):
1. Adult (18 years or over) living in Wales.
2. Confirmed diagnosis of one of the four target conditions.
3. Visible clinical signs of the condition at the time of participation.
4. Clinically stable at the time of participation.

WP1 (clinician panel):
GPs and Advanced Practitioners recruited from North Wales GP Out of Hours services with more than 2 years experience

WP2 (incident reports):
1. Report meets the definition of a patient safety incident (any unintended or unexpected incident which could have, or did, lead to harm for one or more patients receiving healthcare)
2. The consultation involved a video consultation or images shared with a doctor
3. The report contains sufficient information to determine what happened and the aetiology and type of the incident

WP3 (stakeholders):
1. Holds, or has held within approximately the previous three years, a senior role enabling influence over policy, regulation, service delivery, commissioning, professional standards, industry practice or patient advocacy relevant to image-enabled remote healthcare
2. Has experience or a perspective judged, through stakeholder mapping, to be relevant to implementation of standards and guidance
3. Can contribute system-level insight into how evidence is interpreted, prioritised or operationalised
4. Aged 18 years or over, and able and willing to provide informed consent
5. Can participate in English or Welsh

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
104 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
WP1:
1. Clinically unwell at the time of participation
2. Lacks capacity to consent
3. Participation would pose a risk to wellbeing

WP3:
1. No credible current or recent route to influence policy or practice in this area
2. Unable to provide informed consent
3. Direct involvement creates an unmanaged conflict of interest that would make participation inappropriate (reviewed by the Chief Investigator and documented)

WP2:
None beyond failing the inclusion criteria

Date of first enrolment
01/12/2026

Date of final enrolment
30/08/2028

Locations

Countries of recruitment
United Kingdom

Wales

Study participating centre
Bangor University
College Road
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Wales
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Study participating centre
Betsi Cadwaladr University Lhb
Executive Offices, Ysbyty Gwynedd
Penrhosgarnedd
Bangor
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LL57 2PW

Study participating centre
Cardiff University
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CF10 3AT

Sponsor information

Organisation
Bangor University

ROR

https://ror.org/006jb1a24

Funder(s)

Funder type

Funder Name
Health and Care Research Wales

Alternative Name(s)
Health & Care Research Wales, Health Care Research Wales, Ymchwil lechyd a Gofal Cymru, HCRW

Funding Body Type
Government organisation

Funding Body Subtype
Research institutes and centers

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available