STUDY PROTOCOL

A mixed methods protocol to evaluate the effectiveness and acceptability of COVID-19 Community Assessment Hubs

[version 1; peer review: 1 approved with reservations]

Sophie Mulcahy Symmons1, Robert Fox1, Marese Mannion2, David Joyce1, Aoife De Brún1, Liam Glynn2,3, Damien Ryan2,4, Niamh Keane5, Eilish McAuliffe1

1Interdisciplinary Research Education and Innovation in Health Systems (IRIS) Centre, School of Nursing, Midwifery and Health Systems, University College Dublin, Dublin, D04 V1W8, Ireland
2School of Medicine, University of Limerick, Limerick, V94 T9PX, Ireland
3HRB Primary Care Clinical Trials Network Ireland, Galway, Ireland
4ALERT, Emergency Department, University Hospital Limerick, Limerick, V94 F858, Ireland
5Department of Public health Nursing, Health Service Executive, Dublin, Ireland

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Abstract

Background: Ireland’s health system has been under significant strain due to staff shortages and inadequate capacity. Critical care bed capacity per capita in Ireland is among the lowest in Europe, thus, the coronavirus disease 2019 (COVID-19) pandemic has put additional strain on an over-stretched system. COVID-19 Community Assessment Hubs (CAHs) were established to mitigate unnecessary admission to acute hospitals, and reduce infection spread by supporting COVID-19 positive or suspected positive patients to isolate at home, or in isolation facilities. There is some evidence that similar assessment centres may be a successful triage strategy to reduce burden on hospital and acute care.

Aim: The aim of this study is to evaluate the impact of COVID-19 Community Assessment Hubs on service delivery in one region in Ireland.

Methods: A mixed-methods approach will be used, incorporating co-design to engage stakeholders and ensure informed data capture and analysis. Online surveys will assess CAH patients’ experiences of access to and quality of care. Clinical patient data from CAHs will be collected and analysed using multinomial logistic regression to check for association with patient demographics and COVID-19 symptoms, and CAH early warning scores and outcomes (Transfer to Emergency Department, Transfer to isolation unit, Sent home with care plan). Semi-structured interviews will be conducted with: patients to elicit an in-depth understanding of experiences and acceptability of attending
CAHs; and staff to understand challenges, benefits, and effectiveness of CAHs. Interview data will be analysed using a thematic analysis approach.

**Discussion:** This study will provide valuable insights from both patient and staff perspectives on the operation of CAHs. We will evaluate the effectiveness and acceptability of CAHs and propose areas for improvement of the service. This will contribute to international literature on the use of community assessment centres during infectious disease pandemics.

**Keywords**
Community Assessment Hubs, COVID-19, coronavirus, patient experience, staff experience, mixed methods
Introduction
The coronavirus disease 2019 (COVID-19) pandemic has created substantial demands on the Irish healthcare system. Irish hospitals operate at near full capacity on a regular basis (Keegan et al., 2019), and the COVID-19 pandemic has raised concerns whether all COVID-19 patients can receive the care they need. The low ratio of ICU beds to population size compared to other countries is of concern (Keegan et al., 2019; Rhodes et al., 2012), given late presentation to hospital and subsequent rapid deterioration, resulting in more patients requiring admission to the intensive care unit (ICU). High levels of COVID-19 amongst healthcare staff adds to the existing staff shortages and demand on the system (Kennelly et al., 2020). Ireland’s low GP to population ratio (Teljeur et al., 2010) has meant that primary care is experiencing challenges managing the surges in COVID-19 positive or suspected positive patients. The healthcare system in Ireland is not well-equipped to manage an escalating number of people presenting with COVID-19 symptoms, mild or severe.

We now have evidence that the majority of COVID-19 patients suffer with mild to moderate symptoms and can be cared for remotely in self-isolation (Greenhalgh et al., 2020), however, severe cases must receive timely care. The ability to detect deterioration in suspected and COVID-19 positive patients early and direct them to the appropriate care setting would have a substantial impact on efficient resource utilisation and patient outcomes. Well planned triage strategies in emergency situations can enable more efficient resource utilisation and improve decision-making, particularly important for critical care allocation (Christian, 2019). Triage can ensure that the most appropriate care is provided in the most appropriate setting.

The World Health Organisation (WHO) recommended expanding screening and referral pathways in community settings to ensure preparedness for the COVID-19 pandemic and provide primary care surge capacity (World Health Organisation, 2020). Such examples include fever clinics or influenza assessment centres. Assessment centres were set up globally to protect health systems from over-stretching capacity during the COVID-19 pandemic (Huston et al., 2020). These centres provide specialist services to test, assess, triage, and treat COVID-19 positive or suspected COVID-19 patients in the community rather than in hospitals, but vary in the range of services provided depending on place. Patients receive care plans tailored to their needs and it allows fast-track of severe cases to hospital for more advanced care. Although limited, emerging evidence does suggest that these centres can contribute to reducing the burden on overwhelmed hospitals and acute services (Hall et al., 2013; John et al., 2020; Wang et al., 2020; Yen et al., 2014), allowing other primary care services to run as normal whilst mitigating the risk of infection.

Evidence from the H1N1 influenza epidemic in 2009 suggests that these centres successfully reduced Emergency Department (ED) volumes and avoided overwhelming hospitals in Canada and Taiwan (Hall et al., 2013; Yen et al., 2014). In Taiwan, assessment centres, along with other infection control procedures, were suspected to delay the peak of H1N1 pandemic while vaccines were under development (Yen et al., 2014). Similarly early evidence has shown that fever clinics in China, initially established during the SARS outbreak, were repurposed for the COVID-19 pandemic and reduced infection spread and ED visits (Wang et al., 2020). In Massachusetts, USA, a community COVID-19 management model was set up, which included telehealth, assessments for testing and advice for self-isolation, and respiratory centre for in-person visits (John et al., 2020). This community model of care for COVID-19 patients enabled 92% of patients to be managed at home, and resulted in fewer ED visits compared to the national average (John et al., 2020). However, in England the COVID-19 primary care hubs lacked central guidance and many hubs have closed after evidence showed that utilisation of hubs was low, with responsibility reverting back to GP practices (Majeed et al., 2020).

Following the WHO guidance, the Irish health service announced that COVID-19 Community Assessment Hubs (CAHs) would be established to provide timely specialised services for COVID-19 positive or suspected patients in need of care (Nolan & Ní Bhriain, 2020). Suspected or positive COVID-19 patients can contact their GP for CAH referral if their symptoms are getting worse, they have concerns about breathing or other health conditions or cannot manage symptoms at home (Health Service Executive, 2020). These hubs were staffed voluntarily by GPs, but registrars and primary care staff were also redeployed to CAHs (Bury et al., 2020). Staff deemed high risk of severe COVID-19 (over 60 years, have pre-existing health condition, pregnant) were not asked to work at these hubs. The hubs consists of a multi-disciplinary team of GPs, nurses, physiotherapists, and administrative staff. The aim of the hubs is to prevent patients from overburdening the hospital system by providing timely community based care to COVID-19 positive or suspected positive patients, avoid unnecessary attendance to acute hospital, and maximise the number of patients who can self-isolate at home (Nolan & Ní Bhriain, 2020). GPs can refer deteriorating patients (i.e. patients who can not manage symptoms at home) to these hubs for assessment where a decision to either refer to ED, refer to a self-isolation unit or self-isolate at home is made (see Figure 1 for CAH pathway). Patients are triaged at two stages; firstly, when the referring GP discusses the case with the CAH, and secondly when CAH assessment is complete. The benefits of this approach include reducing infection risks associated with in-person GP attendances and allowing GP services to operate normally, reduction in ED attendance and hospital bed occupancy, and reassurance for the patient and the GP after clear care plans are provided by CAHs. Without this triage strategy, Ireland’s GP and acute care services may have been less capable of managing patients and infection spread, potentially resulting in the health system being unable to manage the volume of COVID-19 patients. The service aimed to take referrals and provide appointments within 2–4 hours. CAHs were staffed for 12 hours a day, 7 days a week. To our knowledge, there has been one study to investigate CAHs in Ireland that focused on the infection control training that staff
received and voluntary uptake to work shifts in these hubs (Bury et al., 2020). This study found that compliance with infection control procedures was high, and staff had positive experiences working in the hubs (Bury et al., 2020).

To date, there is a dearth of research evaluating these centres. In addition, there is very little published on patient experiences of this type of care (Fitzgerald, 2020). We hope to address this gap by exploring the impact of CAHs on service delivery in one region in Ireland. The aim is to assess the effectiveness and acceptability of CAHs during the initial COVID-19 peak and identify how the service might be improved or adapted for future waves of COVID-19 and public health emergencies. This will be achieved by: assessing patient predictors of CAH acceptability; exploring patient experience of CAHs; exploring staff experiences of the acceptability and challenges of CAHs; investigating the predictors for CAH outcomes using CAH patient data. Patient and staff perspectives will be gathered using online surveys and interviews from CAHs in one region in Ireland that were operational during the first wave of the COVID-19 pandemic. Patient outcomes will be analysed using clinical patient data from CAHs in one region in Ireland. Our mixed-methods approach will provide comprehensive findings to inform whether CAHs were acceptable and effective during the pandemic.

**Methods**

**Research design**

This mixed-methods study will adopt an iterative approach, utilising the principles of co-design to engage stakeholders to ensure the optimum study design, efficient data capture, informed analysis, and interpretation of findings as they emerge, and timely and continuous dissemination, to inform the future utility of CAHs now or in future public health emergencies.

There are several components to the study: Cross-sectional study of patient experience using interviews and surveys, Cross-sectional study of healthcare staff experience using interviews, Analysis of existing patient data from CAHs to predict patient outcomes.

**Methods and analysis for each component**

**Cross-sectional study of patient experiences.** Data will be gathered from a cohort of patients via online surveys and interviews to understand their experience using the CAH service. Participants will be recruited via gatekeepers at CAHs. Discharged patients will receive a link to an online survey which also contains the Participant Information Sheet and Consent Form (see extended data (Mulcahy Symmons et al., 2021)). Through this survey, patients also have the option
of providing their contact details to the researchers if they wish to participate in a telephone interview. These participants will then be contacted by a member of the research team to arrange a suitable time for interview, once 7 days have passed since signing the consent form. All fully consented patients who have been discharged from CAHs are eligible for inclusion in the study, those who can do not have capacity to consent, decline to take part, or are under 18 years will be excluded.

In the survey, participants are asked to indicate their age range, gender, ethnicity, educational level, COVID-19 symptoms, underlying conditions, as well as their experience with the CAH service (including access to care, quality of care, information received). Survey data will be quantitatively analysed to determine predictors of overall acceptance of the CAHs. To determine the predictors of patient acceptability of CAHs, multiple regression analysis will be performed using patient quality of care, access and information received, patient demographics (age, gender, ethnicity, and education), COVID-19 symptoms, and access to care as predictor variables.

Approximately 20 follow-up semi-structured interviews will be conducted with patients (on a voluntary basis) who indicate consent to participate to explore their experience and acceptability of receiving care in the CAHs in detail (see extended data (Mulcahy Symmons et al., 2021)). Patients will be purposively sampled to represent the sample demographics. Thematic analysis of interview transcripts will be conducted to explore in detail perceptions of the CAHs and identify common themes (Braun & Clarke, 2006). Themes will be drawn out inductively by one researcher and reviewed and discussed with the research team. Interviews will be coded using NVivo 12 software (QSR International Pty Ltd, 2020). A second researcher will independently code a subset of transcripts to ensure the quality of the research.

**Cross-sectional study of healthcare staff experiences.** Any member of staff who worked at the CAHs for at least one week is eligible to participate in the study. The Participant Information Sheet and Consent Form (see extended data (Mulcahy Symmons et al., 2021)) for the interview will be emailed to staff via gatekeepers. Staff who consent will then be contacted by the research team to arrange a time for interview 7 days after informed consent is received. Staff who have consented to participate will be selected purposively for a representative sample of the multi-disciplinary teams working at the CAHs.

An interview guide will be co-designed to investigate CAH staff experiences working in CAHs (see extended data (Mulcahy Symmons et al., 2021)). Semi-structured interviews with approximately 20 staff will be conducted on the benefits and challenges of CAHs, including changes in clinical practice, communication with and management of patients, and teamwork. Thematic analysis of interview transcripts will be conducted to identify common themes of the challenges and benefits and acceptability of working in CAHs. Initial themes will be identified inductively by one researcher and reviewed with the research team. Interviews will be coded using NVivo 12.

**Analysis of existing patient data from CAHs.** Anonymised data on patient symptoms, early warning scores, deterioration, and admissions will be extracted from the CAHs for the period they were set up until end June 2020. Data will be securely transferred to the research team for quantitative analysis following anonymisation by CAH clinical staff.

Descriptive statistical analysis will be used to provide the sample characteristics. A multinomial logistic regression will be used to determine the association between patient demographics, presumed or COVID-19 positivity, and COVID-19 symptoms, and early warning scores and patient outcomes (Transfer to ED, Transfer to isolation unit, Sent home with care plan). This will allow for determination of the specific variables associated with the different outcomes.

**Ethics**

Ethical approval has been granted by the COVID-19 National Research Ethics Committee (Ref: 20-NREC-COV-093). In accordance with data protection regulations and the data sharing agreement with the partner organisations, patients’ clinical data will be anonymised by on-site healthcare staff and encrypted before being transferred securely to the research team. No identifiable data will be included in the final consolidated dataset. Information sheets will be provided to all prospective interview participants and informed consent will be obtained online for the semi-structured interviews with staff and from patients completing the survey. Participants will be advised they are free to refuse to answer any questions, are free to withdraw at any time without question or reason and are free to take a break during the interview if required. This information will be clearly stated in the information sheets and verbally confirmed prior to beginning any interview. Identifiable information from interviews will be removed from transcripts.

**Dissemination of information**

Results will be disseminated via regular briefings and updates, publication in peer-reviewed journals, national and international conferences where possible, and to relevant stakeholders and interest groups using public forums and social media. Participants who are interested in the study’s findings will be invited to make this known to the researchers and a summary of results will be sent to these participants.

**Study status**

This study is ongoing, we have collected interview data on staff as well as CAH clinical data and begun analysis, and we are recruiting patients for the cross-sectional study of patient experience component of the study.

**Discussion**

The overarching aim to evaluate CAHs in Ireland and determine their effectiveness will be achieved using a mixed-methods approach. Quantitative and qualitative data on patient
and staff experience will provide a dual lens to holistically capture CAHs in operation. This will also provide insight on patients preferred care pathways and staff’s perceptions of the benefits and challenges of delivering care in this way. We will be able to assess how well the multi-disciplinary teams at the hubs worked together and understand where there is room for improvement at these unusual settings. Clinical data will ensure comprehensive analysis of the effects of CAHs on patient outcomes. We will be able to determine whether CAHs achieved their goal of providing timely community-based care to patients, optimise patient outcomes and minimise unnecessary use of acute hospital capacity by maximising the number of patients self-isolating at home. These findings will provide valuable information on the benefits, limitations, and areas of improvement of CAHs. This will be beneficial to all stakeholders and inform decision-making on the implementation and operation of these or similar hubs in the future. These findings may also aid potential repurposing or integration of other COVID-19 services, e.g., rehabilitation and testing, with CAHs to provide improved care of COVID-19 patients.

The findings from this research will have international relevance as it will contribute to improvement of assessment services during the COVID-19 pandemic, and for future public health emergencies, where assessment centres in the community may need to be set up to address need and mitigate hospital visits. Rapid release of findings is intended for this work to aid service improvement of primary care triaging for COVID-19 patients in a time-sensitive manner. It is essential that health systems adapt to the rapidly changing situation caused by the pandemic, as such, this research should inform service development.

There are several hurdles to overcome to conduct research during a pandemic. One challenge to implementing co-design principles is co-ordinating with busy healthcare collaborators, this will be addressed via flexible remote meeting arrangements and sustained open dialogue across sites. Another challenge is recruitment of participants to our study, this will be mitigated through the use of brief surveys and interviews to reduce burden on participants.

**Data availability**

**Underlying data**

No data are associated with this article.

**Extended data**


This project contains the following extended data:

- Staff Interview Guide.docx (Interview guide for staff)
- SFI20-0221 Consent Form (Staff).docx (Consent form for staff)
- SFI20-0221 PIL Staff.docx (Participant Information Sheet for staff)
- Community_Assessment_Hub_patient_survey with consent.docx (Survey for patients (with consent))
- SFI20-0221 PIL Patients.docx (Participant Information Sheet for patients)
- Patient Interview Guide.docx (Interview guide for patients)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

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**References**


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Gerard Fitzgerald
School of Public Health and Social Work, Queensland University of Technology, Kelvin Grove, Qld, Australia

This article outlines a research protocol to evaluate Community Assessment Hubs for COVID 19. These hubs appear to differ from Fever Clinics and testing centers in that they provide specialist assessment but also require GP referral and are not open directly to the public. Thus they act as a substitute for hospital level assessment and are intended to avoid hospital congestion and ED demand.

Community assessment hubs have been part of the mixture of health system strategies used across the world to help manage the COVID 19 pandemic. As such they would benefit from a well structured evaluation to determine their role and benefit in reducing hospital demand and achieving community satisfaction.

The proposal identifies a well structured mixed methods evaluation using both quantitative and qualitative approaches. Perhaps the only additional source of data may be to examine contemporaneous hospital admission and ED attendance data.

What is less clear is whether this is intended as a retrospective or prospective study and when the study did or shall start. This is evidenced in the paragraph which describes the hub in which the words "..would be established..", "...were staffed..." and .."consists of.." are used demonstrating various tenses. It would be beneficial to make this clear to the reader. Publishing a protocol for an extant study is fine. This just needs to be made clear. This is particularly relevant in that the number of cases in Ireland has declined rapidly since peaks in early January and with the roll out of vaccines, it is hopeful that further widespread transmission may be avoidable. Therefore the ongoing need for community hubs may be lessened and their evaluation in this context less useful.

My recommendation is that the authors make the starting date for the study explicit and ensure consistency in tense is used throughout the paper.

Is the rationale for, and objectives of, the study clearly described?
Yes

**Is the study design appropriate for the research question?**
Yes

**Are sufficient details of the methods provided to allow replication by others?**
Yes

**Are the datasets clearly presented in a useable and accessible format?**
Yes

*Competing Interests*: No competing interests were disclosed.

*Reviewer Expertise*: Emergency health systems

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.