



## Improving uptake of hepatitis B and hepatitis C testing in South Asian migrants in community and faith settings using educational interventions—A prospective descriptive study



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### ABSTRACT

**Background:** Chronic viral hepatitis (CVH) is a leading contributor to the UK liver disease epidemic, with global migration from high prevalence areas (e.g., South Asia). Despite international guidance for testing high-risk groups in line with elimination targets, there is no consensus on how to achieve this. The objectives of this study were to assess the following: (1) the feasibility of recruiting South Asian migrants to view an educational film on CVH, (2) the effectiveness of the film in promoting testing and increasing knowledge of CVH, and (3) the methodological issues relevant to scale-up to a randomized controlled trial.

**Methods:** South Asian migrants were recruited to view the film (intervention) in community venues (primary care, religious, community), with dried blood spot CVH testing offered immediately afterwards. Pre/post-film questionnaires assessed the effectiveness of the intervention.

**Results:** Two hundred and nineteen first-generation migrants  $\geq 18$  years of age (53% female) were recruited to view the film at the following sites: religious,  $n = 112$  (51%), community  $n = 98$  (45%), and primary care,  $n = 9$  (4%). One hundred and eighty-four (84%) underwent CVH testing; hepatitis B core antibody or hepatitis C antibody positivity demonstrated exposure in 8.5%. Pre-intervention ( $n = 173$ , 79%) and post-intervention ( $n = 154$ , 70%) questionnaires were completed.

**Conclusions:** This study demonstrated the feasibility of recruiting first-generation migrants to view a community-based educational film promoting CVH testing in this higher risk group, confirming the value of developing interventions to facilitate the global World Health Organization plan for targeted case finding and elimination, and a future randomized controlled trial. We highlight the importance of culturally relevant interventions including faith and culturally sensitive settings, which appear to minimize logistical issues and effectively engage minority groups, allowing ease of access to individuals 'at risk'.

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### Introduction

The UK faces an ever-growing burden of chronic liver disease and its sequelae at a time of significant improvements in the morbidity and mortality of other chronic diseases (Williams et al., 2014). A significant contributor to this is chronic viral hepatitis

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(CVH), a leading cause of liver disease worldwide (NICE, 2012). National and international guidance stress the importance of efforts to close the CVH prevalence gap through case-finding and ultimately treatment. This will minimize the burden of liver disease and its complications, as well as reducing onward transmission of CVH in keeping with the World Health Organization (WHO) call for the elimination of CVH as a public health problem by 2030 (World Health Organisation, 2020). CVH tends to be most prevalent among groups of individuals who traditionally experience barriers to healthcare, e.g., prisoners, drug users, and migrants. Therefore, targeted interventions are required to increase confidence and testing among these groups, with the ultimate aim of reducing inequalities in treatment and disease burden for these high-risk groups.

Despite this impetus towards case-finding, it is unclear whether interventions are effective in achieving this goal. The rate of CVH among migrants is higher than that in the background UK population and is believed to be related to the prevalence in the country of origin (Cochrane et al., 2015). Migrant populations experience poorer health and barriers to accessing services both in the UK (Anderson et al., 2003) and internationally (Szczepura, 2005), with communication and cultural differences likely contributors to the increased morbidity and mortality seen in minority ethnic groups with CVH (Owiti et al., 2015).

In the UK, the National Institute for Health and Care Excellence (NICE) and National Health Service England (NHS England) advocate promoting testing in higher-risk groups, such as migrants from moderate to high prevalence areas (e.g. South Asian countries) (NICE, 2012). NICE recommends community-based interventions; however no guidance is given on how to target at-risk populations (NICE, 2012). There is, therefore, a need to develop tailored interventions to promote case-finding in higher-risk groups of individuals who traditionally experience barriers to healthcare access, e.g., prisoners, drug users, and migrants, and to increase confidence and testing among these groups, with the ultimate aim of reducing inequalities in treatment/disease burden for these groups.

The evidence base for case-finding healthcare interventions is centred around population-based screening programmes (Porter, 2008). Whilst evidence exists on factors influencing an individual's likelihood of screening uptake, the literature is less conclusive regarding the effectiveness of different intervention types, being limited by heterogeneity of data collection and analysis (Porter, 2008; Kelly et al., 2018). However, culturally relevant interventions including the importance of faith, language, and culturally sensitive settings and those that minimize logistical issues may be more effective at engaging minority groups (Kelly et al., 2018). We have developed a short, culturally and linguistically tailored educational film based on qualitative data collected regarding the knowledge, perceptions, barriers, and fears of CVH infection and testing in South Asian populations (Ahmed et al., 2019; Hendy et al., 2019). In this article we report on the feasibility of recruiting members of South Asian communities in England to view the film and subsequently accept CVH screening.

At the time of writing, no evidence of the use of an educational film in promoting case-finding in CVH could be identified.

## Materials and methods

The aims of this study were (1) to determine the feasibility of recruiting South Asian migrants residing in South-East England to view a short educational film based on qualitative data collected during a previous study (Ahmed et al., 2019; Hendy et al., 2019); (2) to determine the effect of this educational intervention on (i) the uptake of CVH testing in community settings and (ii) understanding of viral hepatitis; and (3) to identify methodological issues that

may compromise the acceptability and feasibility of a definitive randomized controlled trial (RCT) of this intervention (Figure 1).

## Study design

### Development of the film intervention

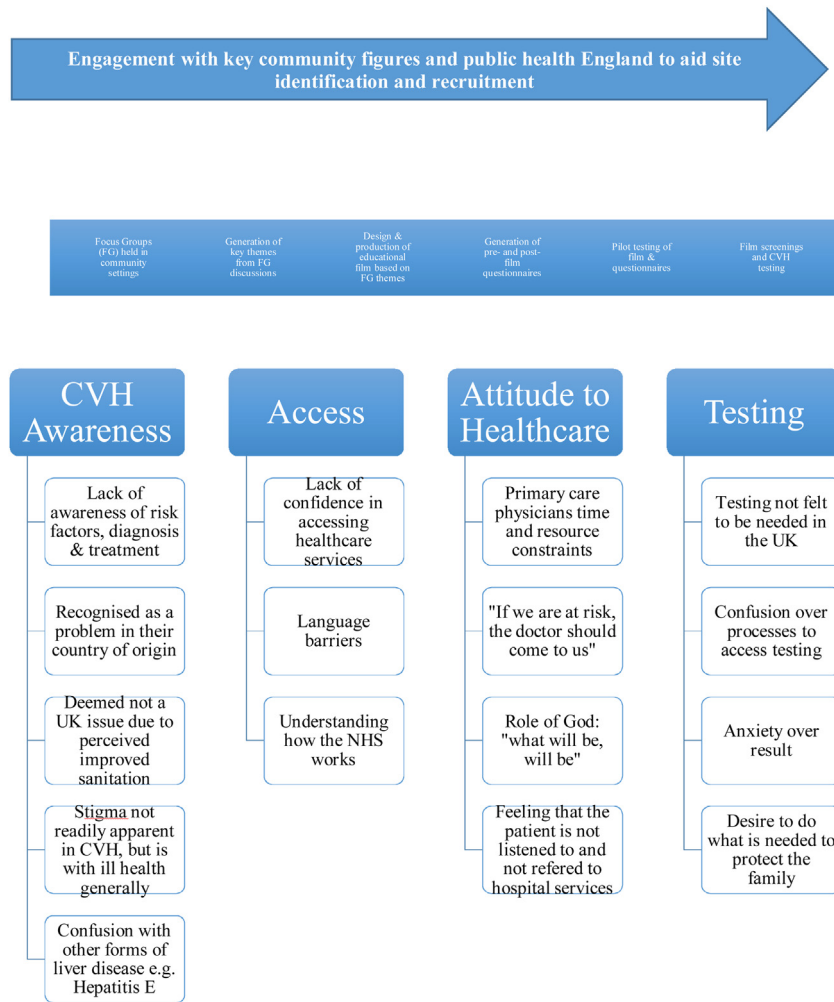
Qualitative data were used to inform the development of a short film (12 min) to explain CVH, modes of transmission, and how to access testing (<https://youtu.be/K3AYyZ3uHro> (English) and <https://youtu.be/dapPV4oul9s> (Urdu with English subtitles)). Eight focus groups were undertaken with men ( $n = 26$ ) and women ( $n = 27$ ) from South Asian communities to understand their knowledge and views on CVH and the role of community-based testing. Thematic analysis led to the generation of key areas to address in the film (Ahmed et al., 2019; Hendy et al., 2019).

Participants stressed the importance of personal stories from the community, therefore the film included testimonies of first-generation South Asian migrants with experience of testing for CVH, including those who tested negative and those previously treated. The film was produced by a professional film-maker with experience in directing and producing educational healthcare films (Cockle-Hearne et al., 2016). The content and style were edited with input from stakeholders and thereafter piloted within the target community to ensure understanding and suitability of language (spoken Urdu with English subtitles). Urdu was chosen because it is the language used by many of the local South Asian community. The subtitles were also available in other South Asian languages as required.

### Recruitment and film screening

Participants were recruited to view the educational film in community settings from February to June 2018 (religious venues, community centres, and primary care facilities) in South-East England. Initially, recruitment was centred around Surrey; however, due to concerns about potential contamination of study sites within this area, i.e. participants visiting different study sites, recruitment was widened to other centres in Greater London, including Hounslow, Wandsworth, and Merton. Seventeen film screenings occurred at 14 different venues including four primary care, four community, and six religious venues. The community venues were a mixture of existing social groups based on ethnicity (mixed gender and religion) and support groups for education and language lessons for new female migrants. The religious venues were all Mosques. The film was shown twice in two of the religious venues (once for each gender) and twice in the same community setting due to the increased interest from the community.

Critically, guidance on recruitment was provided through the help and support of community stakeholders, e.g., community advocates such as primary care doctors, community nurses, and pharmacists and community champions such as faith leaders and councillors. Initial contact from multilingual members of the research team was made with each target site (e.g., faith leader) to explain the nature of the study. When agreement to participate with site was reached, the research team visited again, outlining the project aims and developing community links. Participant information sheets were delivered and a suitable area to show the film was identified. Two weeks prior to the date of scheduled film screening, an advertising campaign in conjunction with community leaders was conducted, with multilingual posters advertising a health educational event. Further advertising depended on the type of venue: (1) religious: the religious leader announced the event at key attendance times, e.g. main prayers; (2) community: the community centre organizer announced a planned health education event to regular attendees; (3) primary care: healthcare staff identified patients from the target population and distributed



**Figure 1.** Summary of the structure of this study.

participant information sheets, research team contacts, and the date of film screening.

The film was shown in group sessions with variable attendance (range 1–80). A lower limit of attendance was not set, as it was felt inappropriate to cancel events as this could diminish trust in the research team.

#### *Inclusion/exclusion criteria*

The following inclusion criteria were applied for this study: first-generation migrants self-identifying as South Asian, age  $\geq 18$  years, able to give informed consent, and able to communicate in English, Urdu, or Hindi. The ethical approval process highlighted that we were providing healthcare education and accordingly that no one should be excluded from viewing the film. Those not meeting the study inclusion criteria were able to view the film but were not recruited to provide research data.

#### *Post-film CVH testing and linkage to care*

Immediately after the film screening, participants were offered CVH testing. A return visit to the venue was scheduled for a week later if the number requiring testing was not manageable on the day or if participants wanted more time to consider testing.

Consent for CVH testing was received separately and privately by a research clinician. As this study was community-based, finger-prick testing with dried blood spot (DBS) kits was used for CVH

testing (Abbott). This tests for hepatitis B surface antigen (HBsAg), hepatitis B core antibody (HBcAb), and hepatitis C virus (HCV) antibody (and reflex HCV RNA testing if antibody-positive), and has a high sensitivity and specificity (Mössner et al., 2016). Each sample was tested in an accredited NHS laboratory, with results available within 7–10 days. Procedures for referral to healthcare services for treatment in the case of a positive blood-borne virus test were agreed in advance of testing.

#### *Pre- and post-film questionnaires (see Appendix)*

To assess the effectiveness of the film, and to determine knowledge pre- and post-film, questionnaires were distributed to those who viewed the film. Questionnaires were designed using a combination of externally validated existing questions, as well as questions designed for this study including knowledge of CVH, prior experience, utility of the film, and intention to test. Answers were provided on a five-point Likert scale, from strongly disagree to strongly agree.

#### *Statistical analysis*

The target sample size of 200 was derived to provide an estimate of the proportion seeking testing following the intervention, with suitable precision, and allowed for a half-width of a 95% confidence interval (CI) for this proportion in the region of 6–7% over a wide range (20–80%) of possible values for this proportion.

Due to the feasibility nature of this study, results are reported as descriptive statistics. Participant characteristics are presented as percentages for categorical variables. Two-sided 95% CI, where applicable, were calculated using StataIC 15.1 (StataCorp LP, College Station, TX, USA).

#### Study success criteria

The success criteria included (1) 40% ( $n = 80$ ) of participants watching the film will be tested; a previous pilot study demonstrated 15–20% uptake of testing without an intervention in a community setting (Readhead et al., 2012); (2) 90% of participants viewing the intervention will complete the pre-film questionnaire; and (3) 80% of participants will complete the post-film questionnaire.

This study received regulatory approval from the National Health Service Health Research Authority (17/LO/0881).

#### Results

Two hundred and twenty-one participants were recruited to view the educational film across 14 different venues, from February to June 2018. Two participants were excluded as they were not first-generation migrants. Therefore, 219 participants were included in the study (see Figure 2). The majority were recruited from religious ( $n = 112$ ; 51%) and community ( $n = 98$ ; 45%) settings; a minority were recruited from primary care ( $n = 9$ ; 4%).

#### General characteristics

Demographic details were collected for the study participants and are illustrated in Tables 1 and 2. The demographic details of those subsequently tested for CVH are shown in Figure 3. One

hundred and eighty-four of the two hundred and nineteen (84%) participants tested for CVH after viewing our film (Figure 2). The overall proportion of participants testing for CVH was similar across all types of site, as shown in Figure 4.

#### Results of the pre- and post-intervention questionnaires

Of the 219 participants who viewed the film, 173 (79%) completed the pre-intervention questionnaire and 154 (70%) completed the post-intervention questionnaire, which was less than predicted. A questionnaire was judged complete if any question was answered. However, many of the questionnaires had missing data points.

Data were available for 142 participants (65%) who filled in both questionnaires. This overall sample was skewed, with 82% ( $n = 117$  responses) completed by those who were tested; in keeping with this, the majority of participants who viewed the film also requested CVH testing. When reviewed by testing status, 64% of those who accepted testing and 66% of those who did not completed both questionnaires.

When asked if the film was useful, 86.6% ( $n = 123$ ) agreed or strongly agreed. There was no difference between the tested and non-tested groups (86% vs 88%). One person disagreed that the film was useful (0.7%), but did undergo testing. The remainder ( $n = 18$ , 12.7%) did not answer the question. Again, this was similar for those who did and did not undergo testing for CVH (13% and 12%, respectively). Participants were asked to rate their confidence in understanding CVH. One hundred and twenty participants responded (85%), with a similar proportion responding from the tested and non-tested groups. Knowledge was unchanged pre- and post-film in 31% ( $n = 37$ ). The majority of those reporting that their knowledge was unchanged ( $n = 21$ ) were confident both before and after the film. A small number were not confident in their

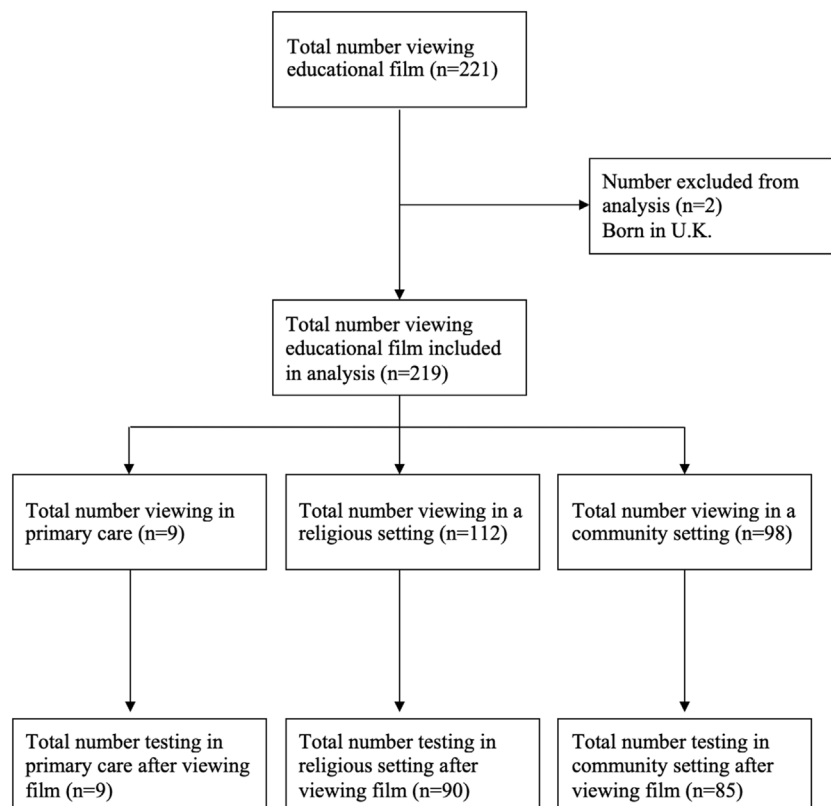


Figure 2. Total number recruited to view the educational film.

**Table 1**  
Demographic details of those recruited to view the educational film by venue type.

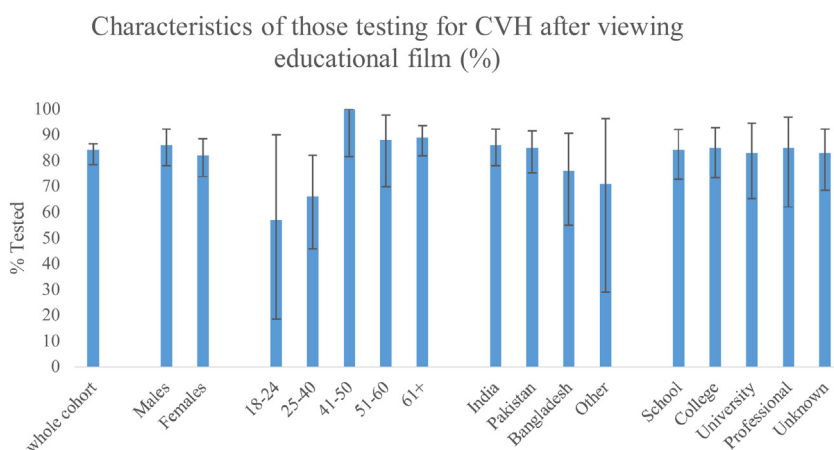
	Community recruitment, <i>n</i>	Religious recruitment, <i>n</i>	Primary care recruitment, <i>n</i>	Total recruitment, <i>n</i>	Total recruitment %
Gender					
Male	23	74	5	102	47%
Female	75	38	4	117	53%
Age (years)					
18–24	–	7	–	8	4%
25–40	1	24	4	29	13%
41–50	1	16	1	18	8%
51–60	8	17	2	27	12%
61+	87	45	2	133	61%
Unknown <sup>a</sup>	1	3	–	4	2%
Country of origin					
India	84	17	1	102	47%
Pakistan	3	74	8	85	39%
Bangladesh	6	19	–	25	11%
Other South Asian	5	2	–	7	3%
Highest educational attainment					
School	34	29	–	63	29%
College	20	38	2	60	27%
University	10	16	4	30	14%
Professional	11	6	3	20	9%
Unknown	23	23	–	46	21%

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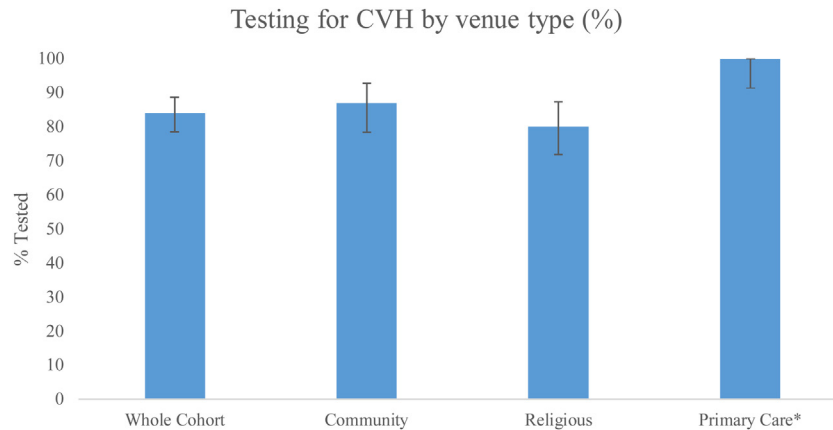
**Table 2**  
Demographic details of those recruited for testing alone through word of mouth in the community.

Demographic	Tested ( <i>n</i> )	Demographic	Tested ( <i>n</i> )
Religious		Community	
Whole cohort	14	Whole cohort	31
Gender		Gender	
Male	12	Male	17
Female	2	Female	14
Age (years)		Age (years)	
18–24	2	18–24	0
25–40	1	25–40	0
41–50	2	41–50	3
51–60	3	51–60	1
61+	6	61+	27

knowledge ( $n = 6$ ) and a further small number neither agreed nor disagreed ( $n = 10$ ). Knowledge improved (from either neutral/not confident to confident) post-film in 58% ( $n = 70$ ). There appeared to be a trend towards improved knowledge post-film in the non-tested group ( $n = 16$ ; 64%) compared with the tested group ( $n = 54$ ; 46%). A small number reported a fall in confidence (from confident to not confident or neutral) in their knowledge ( $n = 13$ ; 11%). Prior experience of CVH was assessed as a possible confounding factor in testing; however, around one-third of respondents did not provide an answer. Few patients had any personal experience of CVH (tested group:  $n = 8$  (7%); non-tested group:  $n = 1$  (4%)). There was some experience in a family member (tested group:  $n = 34$  (29%); non-tested group:  $n = 5$  (20%)). However, 32% ( $n = 77$ ) and 44% ( $n = 11$ ) reported no experience of CVH in the tested and non-tested groups, respectively.



**Figure 3.** Characteristics of those undergoing chronic viral hepatitis testing after viewing the film, including percentage tested by gender, age, country of origin, and educational attainment; two-sided 95% confidence intervals are shown.



**Figure 4.** Testing for chronic viral hepatitis by site, including two-sided 95% confidence intervals (\*one-sided 97.5% confidence interval).

### Word of mouth testing uptake

During a pre-arranged repeat visit at both a community and religious venue to test participants, members of the community who had not seen the film requested testing ( $n = 31$  and  $n = 14$ , respectively; Table 2, Figure 5). A clinician discussed this with each individual and obtained written informed consent prior to testing. All participants who approached us in this manner consented to testing and mentioned their awareness of our community work and the film specifically. Anecdotally, they were informed about the nature of CVH and its transmission, stating that they had obtained this information from others who had viewed the film.

### Results of CVH testing

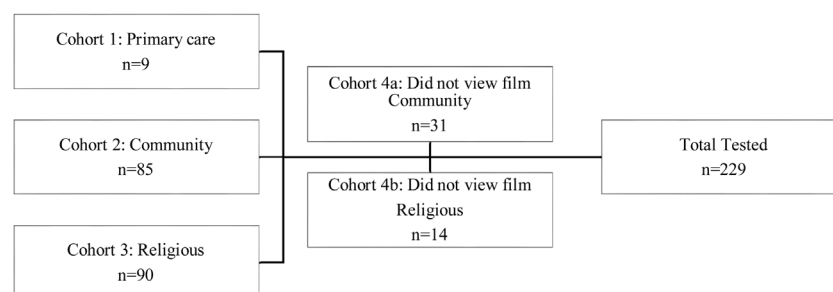
Of the 229 tested ( $n = 184$  having viewed the film and  $n = 45$  testing through word of mouth), 18 required a repeat test as the original result was inconclusive (equivocal result, smaller sample size affecting sensitivity of the test), but opted not to have this done. These 18 participants were excluded from further analysis. Eighteen (8.5%) participants of the 211 tested with valid results had exposure to CVH (see Figure 6). There were no infections detected in primary care patients. There were no HCV exposures in the community venues. There were, however, five cases of previous hepatitis B virus (HBV) exposure (HBcAb) and one active HBV infection (HBsAg-positive). The three patients with HCV exposure were discovered in religious venues, including one active infection with seven HBV exposures, and one active HBV infection.

### Discussion

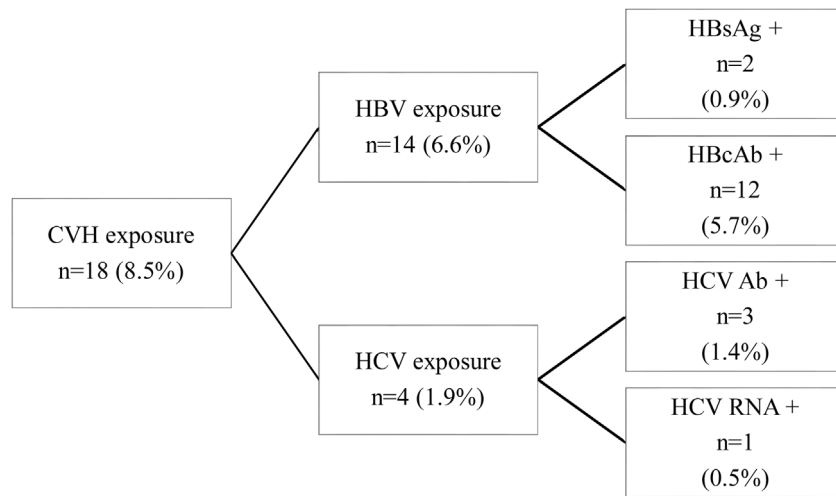
The South Asian migrant population in the UK represent a higher-risk group of individuals who are often unaware of their CVH risk. In this study, it was found to be feasible to reach the

target audience and recruit individuals from South Asian groups to view a short educational film on CVH in community venues, with subsequent uptake of CVH testing and treatment if required. This study satisfied the major pre-defined criteria for success: 84% versus 40% of participants watching the film being tested. Whilst there did not appear to be any relationship between film venue, gender, country of origin, or level of education and the decision to test, age appeared to be linked. This cohort was skewed towards relatively older participants, and while testing uptake appeared lower in younger people (57%, 95% CI 18–90% for 18–24-year-olds), the small numbers viewing the film in this age range ( $n = 8$ ) precludes robust statistical inference. A particular success of this study was the recruitment of the older age group and females (53%) to the film screening, as well as testing for CVH, as females have often been underrepresented in prior studies (Jafferbhoy et al., 2012); this was likely due to holding events in culturally sensitive settings. We did find recruitment of females was more effective in community groups rather than religious settings. It may be that these pre-existing community groups gathered at a time during the day when children were at school and so there was more time to discuss this work. We found during our attendance at religious venues that women were time-pressured in their role as carer to children and other family members.

Additionally, the study targeted inner city areas that were relatively deprived, as well as more affluent areas of South-East England, and we did not find any difference in ability to recruit to view the film or in testing for CVH. Notably, a number of participants ( $n = 45$ ) requested testing for CVH without having seen the intervention. This may suggest that other factors including community endorsement may be relevant in testing. Anecdotally, these participants had an understanding of the risk factors for CVH and had knowledge of the wider work we had been undertaking in the community, suggesting that other forms of public interest message have been successful, e.g., providing test facilities at the



**Figure 5.** Number of participants testing by venue type including those testing through word of mouth.



**Figure 6.** Exposure to chronic viral hepatitis detected, with percentage of the overall tested cohort shown.

same time increases uptake, is impactful, and achieves the objective of the educational programme. Whilst it is possible that the offer to test was taken up independently of the film, our experience suggests that word-of-mouth spread of information in this community appears critical.

Finger-prick DBS testing was found to be appropriate for the study, considering the community setting. However, the results of these tests were not available immediately and required further contact with the participants to inform them of the results. A point-of-care test with immediate results could lessen the time and logistical burden of this type of outreach work, particularly given that the nature of case-finding work in CVH requires mass testing. This may also allow a one-stop clinic where transient elastography, blood-borne virus testing, and onward treatment could be possible. However, careful consideration to maintaining confidentiality in the community setting would be essential.

Considerations for scale-up and a future RCT will be driven by those who will use this film locally and nationally. This will require engagement with key local and national public health agencies such as Public Health England, the National Screening Committee, and primary care organizations, as well as the hepatology community, faith leaders, community organizations, and the third-sector to deliver this sustainably. The advantage of this work is that the film intervention is now made. Therefore, for a full RCT we would have costs relating to technology (use of a laptop, projector, and speaker system) to demonstrate the film in the

community. These items were purchased as part of this study. For a wider rollout, we would anticipate the availability of a further two setups to allow sessions to run at different sites. The costs of the feasibility work were related primarily to staff costs, which included a research assistant with knowledge of the community and languages. We propose using a community-based knowledge champion, e.g., local councillor or faith group leader such as an imam, or alternatively a knowledge advocate such as a community pharmacist, who will require initial training and ongoing salary costs. However, we would aim to develop this role within existing operational delivery networks for hepatitis C. The educational campaign would have to be modified to provide details of the number of people exposed and so exact costings are currently being determined.

Whilst recognizing the feasibility nature of this study, we note limitations that are important to consider for a future RCT to test the efficacy of the intervention (see Table 3). First, primary care recruitment was predictably poor, which underlines the need for a community setting and less medical environment. The identification of reasons for this would improve the dataset further, particularly in light of the success of other recent studies in this area (Flanagan et al., 2019). A possible factor was that patients were informed of the educational event when attending an appointment with their healthcare provider and so may have had other health concerns at the time. A systematic method of identifying the target population, such as a health records search,

**Table 3**

Specific areas of concern and proposed details for future proposed scale-up of RCT.

Trial activity	Specific area of concern highlighted in the feasibility study	Proposed solution for scale-up to trial
Recruitment	Low primary care recruitment number	Targeted recruitment through:(i) Use of electronic health records data(ii) Media including national/global key opinion leaders promoting testing, e.g., Bollywood personality(iii) Pathway finder to facilitating link between recruitment and primary care
	Participants mainly recruited from older age groups	(i) Explore delivery in new venues, e.g., youth clubs, community groups, antenatal clinics in high South Asian populations as a venue to improve engagement with women(ii) Peer lead recruitment(iii) Promote social networks (iv) Media including national/global key opinion leaders promoting testing, e.g., Bollywood personality
Results	Hard to follow up with participants after point-of-care testing	Undertake PPI to explore ways to simplify follow-up:(i) Via text messaging(ii) Coordination via key link personnel through, e.g., pathway finders supported by clinical commissioning groups(iv) Point-of-care testing results for HCV RNA(v) One-stop shop FibroScan
	Low rates of questionnaire completion	(i) Simplify questionnaire(ii) Real-time onsite completion using tablet keypads

HCV, hepatitis C virus; PPI, Patient public involvement; RCT, randomized controlled trial.

would allow us to reach more participants. Second, many of the participants were from older age groups (age 61+ years) reflecting recruitment from community centres usually frequented by retired people. Film screenings were also held in the evenings and at weekends to try to balance this effect, and whilst we did recruit smaller numbers across other age ranges, the population remained skewed towards older participants; hence, the results may not be as applicable across other age groups. It is conceivable that younger migrants may be less likely to visit religious venues (Segal, 2019). Third, we were unable to establish a denominator for recruitment to assess how many participants opted to attend the film screening upon exposure to the advertising campaign. The nature of this study was to advertise to existing groups of people utilizing the recruitment venues, thus it was not possible to specifically assess those individuals who may have heard of this work but decided not to attend the event. In part, we believe this was related to the feasibility nature of this work and we have plans to address this in scale-up to an RCT. Completion of the pre- and post-film questionnaires was inconsistent and did not meet the threshold set for success for this study. Future studies could be streamlined through registration (pre or on site); access to records minimizes the time spent and helps return information back to primary care in real time.

Despite the limitations, this study revealed significant findings that warrant further assessment in a scaled up RCT. Whilst there are some data on case-finding in higher-risk minority groups, these have mainly focused on offering a single opportunistic testing of those already engaged with healthcare services (Hopkins et al., 2019). The UK hospitals working within the context of operational delivery networks (ODN) have been tasked with moving from a traditional treatment role in HCV management only to a case-finding role, which has traditionally fallen to public health. The importance of a community-based approach must not be underestimated, and there is a need for validated tools to support hospitals in delivering this function and meeting operational targets around the treatment of cases [Au?1].

This study utilized the community itself to develop an educational intervention that provides information to the community on risk factors for CVH acquisition, as well as offering advice on obtaining testing. This will help address reinfection and onward transmission of CVH. As vertical infection is important in CVH acquisition, our success in recruiting females is particularly important. Given that the intervention designed for this study is culturally and linguistically tailored to the South Asian community, it is hoped that this film could ultimately be widely available, e.g., in antenatal clinics in areas of high South Asian populations, in order to raise awareness of CVH and its transmission, if proven effective in a RCT. It appears that no other studies have examined the use of a film to provide education as well as offering testing. This method, once fully evaluated in a RCT, should be particularly useful in the real world with the ready availability of technology such as social media and file-sharing sites.

This study successfully addressed NICE and NHS England aims of offering testing, and indeed treatment, in areas familiar to the migrant community. We hope this model of healthcare engagement could help to address some of the barriers to healthcare more generally that migrant communities face.

In this study, higher-risk first-generation South Asian migrant groups were tested for CVH. Positive cases were detected and the individuals were subsequently linked successfully to care. This linkage to care is a fundamental factor in any intervention to improve testing rates for CVH, and we recommend robust plans are made for this in the design of any study of this type. Equally, we believe it is important to test comprehensively for viral hepatitis including previous HBV exposure, particularly as modern healthcare is increasingly utilizing therapeutic agents that carry a risk of

HBV reactivation. We counselled our patients on this risk and informed their primary care physician.

The mode of transmission of infection of HBV and HCV associated with CVH is similar, but approaches to their prevention and treatment are different. With respect to HBV, the availability of an effective vaccine and access to antiviral therapy offer a realistic chance of treating and preventing CVH and liver cancer. In contrast, there is no specific vaccine for HCV, but availability of effective antiviral agents and recent advances in therapies are a welcome opportunity to control this infection and prevent chronic infection and liver cancer. Among other benefits, this study confirms the feasibility of adopting a strategy to ‘find, prevent and treat’ CVH and reduce the global burden of liver cancer. Furthermore, this study has shown that it is feasible to apply this approach, which may be extended to undertake opportunistic screening or testing for other infections to address specific health inequalities, as appropriate.

We believe that the benefits of this study are three-fold. First, offering CVH testing and thus potential diagnosis and treatment to a higher-risk group; second, providing education to be shared more widely within the community; and third, engagement of a higher-risk group with community-based healthcare. Overall, we found a higher than anticipated uptake of testing for CVH after viewing the educational film; however, the feasibility nature of this study limits its ability to prove causation between the intervention and subsequent testing. The effectiveness of this study in promoting CVH testing has led to plans for an RCT to further evaluate this intervention. If successful, this could be the basis of a model to be utilized nationally and internationally in keeping with the emphasis on targeted case-finding, in line with the WHO plan for global CVH elimination. Whilst the study focused on CVH, it provides a model for general health education and screening for a wider range of conditions, point prevalence or enhanced surveillance studies.

#### Author contributions

Claire Kelly: Project administration, Writing: original draft, Investigation, Data curation, and analysis.

Marinos Pericleous: Data curation, Drafting and editing.

Ayesha Ahmed: Study design, Drafting the manuscript and editing, Data curation review and editing, investigation.

Tushna Vandrevala: Methodology, Study design, Writing: drafting and editing, Data curation.

Jane Hendy: Methodology, Study design, Manuscript and editing, Data curation.

Shuja Shafi: Study design, Drafting and editing, Data curation.

Simon Skene: Data analysis, Writing: review and editing.

Sumita Verma: Writing review and editing, Software, data curation.

Chantal Edge: Draft manuscript editing, Data analysis.

Margot Nicholls: Manuscript editing.

Charles Gore: Study design, Writing review and editing.

Simon de Lusignan: Study design, Review and editing.

Aftab Ala: Chief investigator, Methodology, Project administration, Software, Funding acquisition, Data curation, Design, Conceptualisation, Delivery, Writing: review and editing.

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## Ethical approval

This study received regulatory approval from the National Health Service Health Research Authority (17/LO/0881).

## Conflict of interest

The authors have no conflicts of interest.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ijid.2020.08.059>.

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