NHS
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Use of Virtual Reality (VR) in pain and anxiety reduction in inpatient paediatric venepuncture and cannulation

Protocol. Version 4, 30/06/2020

IRAS Number:	275354
Sponsors reference number:	B00823

The undersigned confirm that the following protocol has been agreed and accepted and that the Chief Investigator agrees to conduct the study in compliance with the approved protocol and will adhere to the principles outlined in the Declaration of Helsinki, the Sponsor's SOPs, and other regulatory requirement.

I agree to ensure that the confidential information contained in this document will not be used for any other purpose other than the evaluation or conduct of the investigation without the prior written consent of the Sponsor

I also confirm that I will make the findings of the study publicly available through publication or other dissemination tools without any unnecessary delay and that an honest accurate and transparent account of the study will be given; and that any discrepancies from the study as planned in this protocol will be explained.

For and on behalf of the Study Sponsor:

Date: 3006/2020

Signature: 

.....

Name (please print):

Indi Banerjee

Position:

Consultant Paediatric Endocrinologist

Chief Investigator:

Date:
30/06/2020

Signature: 

.....

Name: (please print):

Indi Banerjee

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KEY STUDY CONTACTS

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Sponsor	Manchester University NHS Foundation Trust Oxford Road Manchester M13 9WL
Funder(s)	Manchester University NHS Foundation Trust Cobbett House Manchester Royal Infirmary Oxford Road Manchester M13 9WL
Key Protocol Contributors	Professor Indi Banerjee (as above) Dr Chris Worth (as above) Dr Tony Payton Tony.Payton@manchester.ac.uk 0161 2755714

STUDY SUMMARY

It may be useful to include a brief synopsis of the study for quick reference. Complete information and, if required, add additional rows.

Study Title	Virtual Reality for Pain and Anxiety in Children
Internal ref. no. (or short title)	B00823
Study Design	Feasibility/Acceptability study
Study Participants	Children aged 5-13 years who require cannulation or venepuncture as an inpatient
Planned Size of Sample (if applicable)	32
Follow up duration (if applicable)	None
Planned Study Period	4 weeks
Research Question/Aim(s)	• Conduct initial acceptability/feasibility testing of VRH use with children undergoing venepuncture or cannulation in an acute, often unplanned inpatient setting in a children's hospital. • Assess level of child and parent reported pain during procedure as well as change in heart rate.

	• Generate pilot data to design software and develop methods, outcome measures and patient/family engagement for a large randomised control trial (RCT) in the same setting to establish efficacy of VRH in reduction of perceived pain.

FUNDING AND SUPPORT IN KIND

FUNDER(S) (Names and contact details of ALL organisations providing funding and/or support in kind for this study)	**FINANCIAL AND NON FINANCIALSUPPORT GIVEN**
Manchester University NHS Foundation Trust Contact details as above	£9380
VREvo Contact details as above	Non-financial advice and support given in planning of study and in use of Virtual Reality Headsets.

ROLE OF STUDY SPONSOR AND FUNDER

Manchester Foundation Trust are the main sponsor. They will have joint responsibility with the study team for the design, conduct and management of the study. The study team will perform data interpretation and analysis and then write the manuscript. They will take responsibility for submission of the manuscript for publication dissemination of results. They will take responsibility for the planning of follow up studies. They and not the funder will control all final decisions over the study.

VREvo are a Virtual Reality Education company part owned by the University of Manchester. They were involved in the planning of the study and will aid in the use of the technology during the study. They have provided training on how to use the technology. They will be involved in drafting the final manuscript and planning any follow up studies.

ROLES AND RESPONSIBILITIES OF STUDY MANAGEMENT COMMITEES/GROUPS & INDIVIDUALS

Patient & Public Involvement Group

The study has been designed after taking feedback from 330 people in the University of Manchester, of whom 80% were medical and university students. To help with the study, a 12-year-old female and a 10-year old male were specifically asked to help with the design, questions and further feedback. The parents of these children were also invited for comments and suggestions.

PROTOCOL CONTRIBUTORS

Professor Indi Banerjee – Consultant paediatric endocrinologist. Chief Investigator. Oversight of and involvement in the design, conduct, data analysis and interpretation, manuscript writing, and dissemination of results.

Dr Chris Worth – Research fellow in paediatric endocrinology. Study co-ordinator. Primary responsibility for design, conduct, data analysis and interpretation, manuscript writing, and dissemination of results.

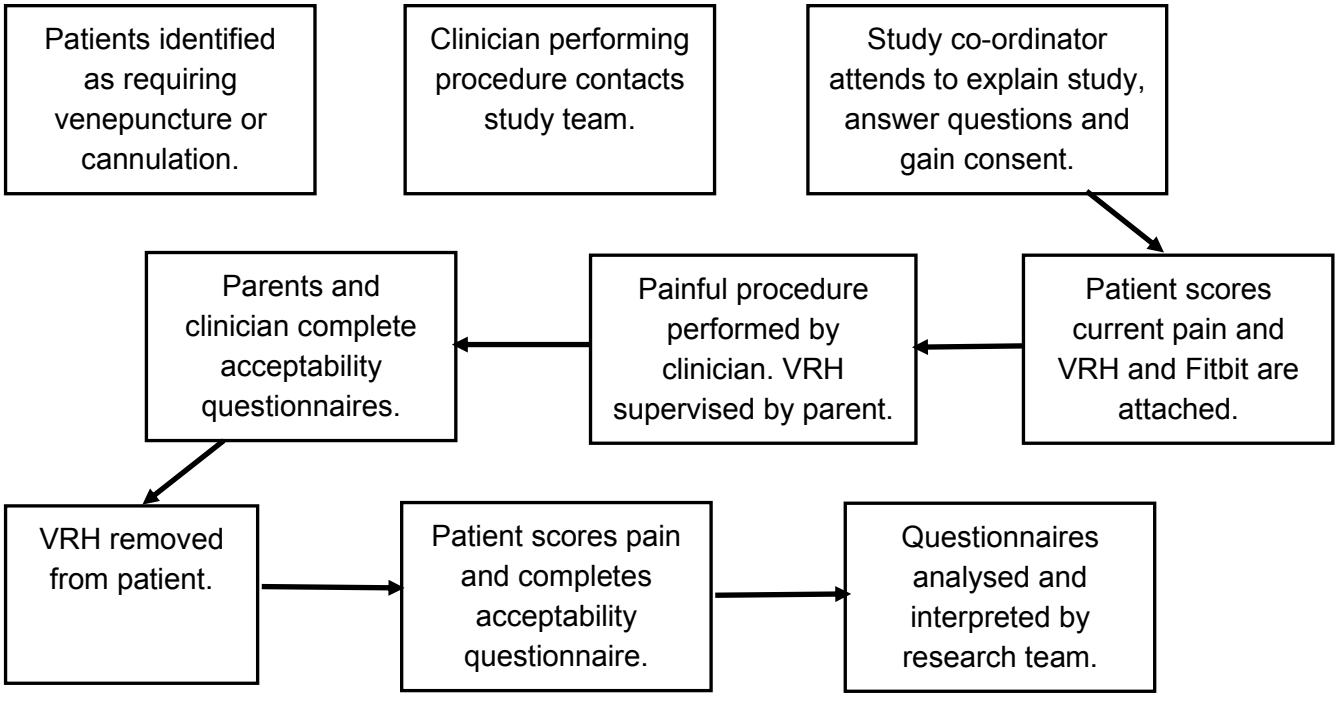
Dr Anthony Payton – Senior Lecturer in Healthcare Sciences, i3HS lead, VREvo CEO. Involved in design, conduct, data analysis and interpretation, manuscript writing, and dissemination of results.

As discussed above, children and their families were involved in the design of this study and pilot studies testing use of VRHs.

KEY WORDS:

Virtual Reality
Painful Procedures
Anxiety
Pain
Children
Feasibility

STUDY FLOW CHART



STUDY PROTOCOL

Virtual Reality for Pain and Anxiety in Painful Procedures

1 BACKGROUND

Virtual reality (VR) technology is making rapid progress into many aspects of daily life and work and the potential applications within the field of medicine are huge, particularly amongst the paediatric population.

Venepuncture and cannulation are common procedures in paediatrics and, despite developments in analgesic sprays and creams, it remains a procedure most children dread and which is uniquely distressing to patients, families and clinicians alike. Even children who undergo regular venepuncture often find this distressing. A lot of the pain and fear associated with venepuncture is psychological and secondary to the fact that most children become apprehensive before and distressed during the process. The sight of doctors, nurses, clinical environments and apparatus required for cannulation/venepuncture is frightening to young children. Distraction is very effective in reducing pain and anxiety in paediatric procedural pain[1] but requires multiple members of skilled staff, cooperative, engaged parents and the time to coordinate all of this.

The immersive nature of wearing a Virtual Reality Headset (VRH) in an outpatient or emergency department setting provides a very effective distraction to children, reducing the anxiety and pain associated with venepuncture and cannulation[2]. A number of studies have explored the application of VRH in children and young people and reported promising early outcomes. However, as these studies are variable in design, software application, setting and cultural context, it is not possible to extrapolate acceptability, satisfaction and positive gain between groups tested for VRH utility. There have been no VRH studies in children in the UK and no studies have evaluated the application in inpatient children with complex disease.

In the University of Manchester, our group has engaged with children to assess feasibility of use and acceptability of different VRHs. VRHs were very well received and the Oculus Go was felt to be an appropriate size and fit for children aged 5 to 13 years. Initial and qualitative feedback has been overwhelmingly positive with 96% of over 300 people surveyed expressing enthusiasm about the use of VRHs.

The majority of venepuncture and cannulation occurs in an inpatient setting and therefore often with minimal prior notice due to staff availability and the transient nature of cannulae in small children. This means that additional staff support for distraction is often not available during the day and almost never out of hours in busy hospitals with a stretched workforce. As children become older they are more aware of the hospital and often become more anxious and less easily distracted by standard play distraction techniques. The use of a VRH could be easily employed at short notice by a single practitioner when venepuncture/cannulation is required and support staff are not available for distraction. Parents can be left to supervise their child using the VRH while clinicians focus on the clinical procedure. No studies have investigated the feasibility and acceptability of VRH use in a paediatric inpatient setting in a busy Children's Hospital where distraction is often required at short notice.

[1]Ali, PediatrEmergCare, 2016
[2]Chan, JPediatr, 2019

2 RATIONALE

We want to know if it is feasible to use VRH for distraction during painful procedures in paediatric inpatients. Utility of this cannot be extrapolated fromoutpatient/clinic/emergency department studies.

We want to know if this is acceptable to patients, parents and clinicians and if they would be keen for this to become routine practice for painful procedures in our hospital.

Painful procedures are a source of significant stress and anxiety to children who are inpatients in hospital and it is our duty as clinicians to understand if there is a way in which we can reduce this stress and anxiety.

If use of VRHs during painful procedures was found to be simple, effective and desirable this could be easily and quickly rolled out to all of our inpatient wards and later to other hospitals. This could have a significant impact upon the inpatient stay of children all over the country.

This project will be conducted in accordance with the study protocol and the ethical principles outlined by Good Clinical Practice (GCP) and the Declaration of Helsinki in its most current version.

3 THEORETICAL FRAMEWORK

The above approach is entirely appropriate to answer our research question. As there have been no studies using VRHs for painful procedures in children who are inpatients before, it would be inappropriate to conduct a randomised controlled trial looking in to relative pain and anxiety reduction without first conducting feasibility and acceptability trials. This is why we have chosen the above approach. This study will directly answer our study questions.

4 RESEARCH QUESTION/AIM(S)

4.1 Objectives

1. Conduct initial acceptability/feasibility testing of VRH use with children undergoing venepuncture or cannulation in an acute, often unplanned inpatient setting in a children's hospital.
2. Assess level of child and parent reported pain during procedure as well as change in heart rate.
3. Generate pilot data to design software and develop methods, outcome measures and patient/family engagement for a large randomised control trial (RCT) in the same setting to establish efficacy of VRH in reduction of perceived pain.

4.2 Outcome

1. Perceived and reported pain/anxiety scores for children undergoing venepuncture or cannulation with VRH.
2. Change in heart rate before, during and after painful procedure
3. Clinicians' feedback on the use of VRH in inpatient painful procedures

5 STUDY DESIGN and METHODS of DATA COLLECTION AND DATA ANALYIS

Practitioners will be encouraged to contact the research team each time they are to perform a procedure between 0830H and 1600H and, unless already with another child using VRH, the research team will come to speak to parents to consent to the study. If consent is obtained then the procedure will be performed using current standard care as well as use of a VRH. The Oculus Go is a cheap and quick to set up headset. Off the shelf software will be selected that will distract but not require the movement of both arms. Software such as The Blu, Ocean Rift and Pet lab will be selected, dependent upon the age of the patient.

VRH will be brought to the room planned for procedure and set up for the child as part of the preparation for venepuncture/cannulation. Prior to application of VRH children will be asked to score their current pain score using the Wong Baker Faces Score (WBFS)[1]. This will be transcribed by the researcher. VRH use will be commenced at least 3 minutes prior to commencement of painful procedure. The procedure will then be performed by the practitioner and VRH supervised by parent(s). The researcher will not participate in the procedure beyond initial setup of the VRH to ensure real world feasibility is being tested for. Once the procedure is completed, the child will be allowed to continue using the VRH while clinicians and parents involved in the procedure fill in the feedback forms.

Feedback forms for parents will focus on perceived pain score and short qualitative review regarding acceptability, whether they would consider repeat application at subsequent venepuncture procedures, if VRH was well tolerated and whether they felt it helped. Feedback from clinicians will focus on ease of use of VRH, if they felt it facilitated procedure or whether it was felt to prolong the procedure. Forms will be filled in by parents and clinicians themselves and then handed to the researcher.

Children will then have the VRH removed and be asked to score their current pain again using the WBFS. Children's WBFS will be compared pre and post procedure. Assessment of acceptability/feasibility for children will be based on 3 **questions** – 1. Do they like it, 2. Was VRH wear comfortable and 3. Did they feel unwell whilst wearing VRH. Questionnaire answers will also be used to design future trials and bespoke VR software.

Questionnaires will then be pseudonymised and transcribed on to a secure computer for analysis of data. Interpretation of data will be performed by the clinical research team. Any statistical analysis required will be performed using SPSS Statistics 25 on pseydonymised datasets. Paper questionnaires will be kept in a locked drawer, in a locked room, on a locked research unit where access is only via swipe card. Access to paper questionnaires and digital data will only be for the immediate clinical research team of Professor Banerjee and Dr Worth.

[1] Wong-Baker FACES Foundation (2018). Wong-Baker FACES® Pain Rating Scale. Retrieved [11/10/19}] with permission from http://www.WongBakerFACES.org

6 STUDY SETTING

The study will be performed on all paediatric inpatient wards at Royal Manchester Hospital. The research team will be based on the CCRF (Children's Clinical Research Facility) and will move to each ward as required to provide VRH for procedures. Participants will be accessed via identification by clinicians performing painful procedures.

Royal Manchester Children's Hospital is the busiest children's hospital in the UK. Venepuncture and cannulation are routinely performed by a wide variety of staff including doctors, nurses and the IV access team. It is therefore an ideal location to conduct this study. Participants will undergo recruitment, discussion with the research team, consent and procedure all in the same location within

Royal Manchester Children's Hospital. Participation in the study will not impact upon patient care and will not require patients or parents to move anywhere or do anything they would not already be doing as part of their inpatient stay.

7 SAMPLE AND RECRUITMENT

7.1 Eligibility Criteria

7.1.1 Inclusion criteria

Any child of age 5-12 years who are an inpatient in Royal Manchester Children's Hospital over a 4 week study period will be considered for consent if they require venepuncture or cannulation for a medical reason as determined by their lead medical team.

All individuals will be considered for inclusion in this study regardless of age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion and belief, sex, and sexual orientation except where the study inclusion and exclusion criteria EXPLICITLY state otherwise.

7.1.2 Exclusion criteria

Children under the age of 5 years (may not fit the headset, may become upset) and over the age of 12 years (pubertal, more mature understanding and expectations) will be excluded.

Children not needed venepuncture or cannulation will not be invited.

Children who have worn VRH previously and recognise dizziness/sickness or other ill health symptoms will not be asked to consent.

Parent/ guardians of children who are unsure about VRH will be excluded.

Parents will not be excluded if their first language is not English. As far as possible a translator will be arranged to translate child/parent responses and give feedback.

7.2 Sampling

7.2.1 Size of sample

For this feasibility study, we aim to recruit 32 children during a 4 week period. Using the primary outcome acceptability of patient use, 32 children will enable us to identify our acceptability target of 75% of patients with 95% CI 56.6-88.5% (Clopper-Pearson exact). This number will also provide meaningful representation of a spread of gender, age groups, complexity of underlying illness, cultural and ethnic backgrounds to design future studies.

7.2.2 Sampling technique

All children who are identified as eligible by clinicians will be considered for the study. If they meet the inclusion criteria and consent to the study they will be included. As this is purely a feasibility study no sampling technique beyond this will be required.

7.3 Recruitment

The study will be advertised a month and two weeks prior to the start via email targeting all doctors, IV practitioners and nurses within Royal Manchester Children's Hospital informing them of the availability of VRH headsets for distraction during venepuncture/cannulation. Posters detailing similar information will be distributed across all paediatric wards and in treatment rooms. Information will also be available on the trust intranet.

7.3.1 Sample identification

Clinicians who regularly undertake venipuncture and cannulation in the hospital will be made aware of the study two weeks ahead of the beginning of data collection via posters and emails. Clinicians will be responsible for informing the research team of eligible patients for the study. All patients who meet the eligibility criteria and are highlighted to the research team will be included.

7.3.2 Consent

Informed consent will be taken from parents of patients recruited to the study. Both patients and parents will be given a written information sheet to read prior to consent. Once they have read this they will have the opportunity to ask any questions of the research team. If they agree to take part then parents will be asked to sign a consent form. Children will be given the option to sign an assent form if they wish but this will not be compulsory.

8 ETHICAL AND REGULATORY CONSIDERATIONS

8.1 Assessment and management of risk

Some children may not prefer to keep the Virtual Reality Headsets over their faces. They may also feel dizzy and be sick. If so, the headsets will be immediately removed and not re-applied. The child will continue to have the routine procedure without application of VRH.

If parents or children are uncomfortable with the application of technology, they will not be consented and VRH will not be applied.

8.2 Research Ethics Committee (REC) and other Regulatory review & reports

- Before the start of the study, a favourable opinion will be sought from the Research Ethics Committee(REC) and Health Research Authority (HRA)

Regulatory Review & Compliance

- Before we enrol patients into the study, the Chief Investigator will ensure that appropriate approvals from participating organisations are in place.
- For any amendment to the study, the Chief Investigator or designee, in agreement with the sponsor will submit information to the appropriate body in order for them to issue approval for the amendment. The Chief Investigator or designee will work with the R&D department) so they can put the necessary arrangements in place to implement the amendment to confirm their support for the study as amended.
- The study will be subject to the annual Self-Assessment questionnaire, for completion by a member of the research team

Amendments

If amendments to the protocol are required, this will be determined by the Chief Investigator who will be ultimately responsible for this. This will be discussed with the Sponsor before submission to the ethics committee

8.3 Peer review

The study protocol has been reviewed by the funder who are Manchester University NHS Foundation Trust. The process for funding approval involved an independent peer review by at least two experts. This review was part of the application for funding under the DiTA funding offered by Manchester University NHS Foundation Trust.

8.5 Protocol compliance

One of the strengths of our protocol is its simplicity and this will significantly improve compliance. Accidental protocol deviations can happen at any time and in this circumstance it would be reported immediately to the Chief Investigator and Sponsor. Any recurrent deviations from the protocol will not be considered acceptable and will be actioned immediately.

8.6 Data protection and patient confidentiality

Only the direct clinical care team will have access to the patients' personal data. The research team (comprising of doctors in the Children's hospital) will not review medical/surgical data for the patient as this is irrelevant to the study and will contravene Data Protection and Confidentiality regulations as per standard clinical practice.

The study data will be analysed by our research fellow at the Royal Manchester Children's Hospital. The results will be discussed with the senior statistician who is also based in the same NHS Trust.

Data will be stored in the department of Paediatric Endocrinology at the Royal Manchester Children's hospital, on a departmental server kept secured by username and passwords. Access to the department is swipe card controlled and the room where the NHS computers with departmental drives are based is secured by a combination lock. Storage of research data will be overseen by the research team. Paper data will be stored in fire proof filing cabinets and kept under lock and key.

Storage and destruction of research data will be carried out in line with trust archiving policies

This is a feasibility and pilot study upon which a formal clinical trial will be launched. While this is an intervention related study, the primary aim is feasibility and applicability rather than efficacy.

The data custodian is the Chief Investigator.

8.7 Indemnity

NHS indemnity applies as this is a trust sponsored study.

Equipment will be purchased using funding money and will be stored securely. There is no insurance in place for damage or loss to the equipment but this is considered to be very unlikely. If equipment was lost or damaged then replacement equipment could be borrowed from VREvo so as to allow completion of the study.

8.8 Access to the final study dataset

Research will not be registered on a public database and data will be kept locally. Identifiable personal data will only used at the time of the venepuncture/cannulation procedure and will not be used at any other time. We will pseudonymise data for analysis and anonymise data when sharing with the statistician, thereby breaking the link between patient identity and relevant data. Publication of data will only include high level outcomes with no patient identifiable information. The only people with access to the original data will be Professor Banerjee and Dr Worth. Pseudoanonymised data will be shared with the statistician.

Parents and children will be asked to contact the research team by e-mail to arrange separate occasions to discuss results. As the study does not collect patient identifiable information the research team will be unable to contact the family after acquisition of data.

The study team will prepare a manuscript with the final study results and this will be submitted to a peer review journal for publication and subsequent dissemination of results.

9 DISSEMINIATION POLICY

9.1 Dissemination policy

Study data will be written up as a manuscript and submitted to a peer review journal for publication. Ownership of the data will rest with the main sponsor.

10 REFERENCES

Ali S et al. An evidence based approach to minimizing acute procedural pain in the emergency department and beyond. *Pediatr Emerg Care.* 2016. 32 (1):36-42

Chan E et al. Virtual Reality for pediatric needle procedural pain: two randomized clinical trials. *J Pediatr.* 2019. 209: 160-167.