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| Host department:Bristol |
| Project Title:  |
| Establishing the clinical and research utility of serial optical coherence tomography-otoscopy and microbiological testing in children with suspected acute otitis media in primary care |
| Proposed supervisory team:  |
| Dr Ashley Hammond: primary care infectious diseases epidemiology (Bristol)Professor Alastair Hay: primary care infectious diseases (Bristol)Dr Ryan Nolan: VP of Clinical Operations & Co-founder (Photonicare)Professor Nick Francis: primary care infectious diseases (Southampton) |
| Potential for cross consortium networking and educational opportunities: |
| * The student will join the 45 NIHR SPCR doctoral students to form a peer group who have the opportunity for regular contact at training meetings and our Annual Trainees Event
* S/he can benefit from the best training and academic opportunities across the 10 institutions and will join a peer-learning group
* S/he will have access to apply for follow-on, post-doctoral funding and seed-corn funding by being embedded in the SPCR and be able to undertake a secondment in Southampton.

S/he will have a mentor, from another consortium member  |
| Project description: |
| Background Acute otitis media (AOM) is a common, painful condition of childhood, often treated inappropriately with antibiotics. The diagnosis is confirmed by the presence of fluid in the middle ear,(1) which is thought to increase pressure within the closed middle ear space, stretching the tympanic membrane, and causing pain. In a recent randomised trial, we demonstrated that antibiotic consumption could be reduced by combining a no or delayed antibiotic prescribing strategy with anaesthetic–analgesic ear drops compared with usual care (open arm comparison).(2) The trial included a third placebo (glycerol) arm which also provided pain relief,(2) but it was not clear if this effect was mediated by placebo, or osmotic effects of the drops reducing middle ear pressure.Optical coherence tomography (OCT), considered the optical analogue of ultrasound imaging, uses a low-intensity light source to produce real-time structural images with micron-scale resolution. This technology is coupled with high-resolution digital otoscopy imaging in the OtoSightTM Middle Ear Scope (www.photoni.care). OCT images produced by reflected light can be analysed and used to objectively differentiate and quantify middle ear fluid from air, as well as characterise fluid properties.(3) (4) (5) Its use within this feasibility study has two purposes: (i) confirmation of the presence of middle ear fluid (and therefore the AOM diagnosis); and (ii) daily serial imaging to visualize and chronicle the natural history of middle ear fluid resolution in a primary care population of children with suspected AOM. The latter is of particular interest because it could help understand whether the mechanism by which anaesthetic/glycerol drops work is to reduce the quantity, and therefore pressure exerted by, middle ear fluid, thereby offering evidence for the use of glycerol only for childhood AOM. Serial daily microbiological evaluation also has two purposes: (i) recording the possible cause of the infection; and (ii) describing the quantitative natural history of upper respiratory tract microbiota in a primary care population of children with diagnosed AOM.Aim and objectivesThe main aim of this PhD is to establish the feasibility, acceptability and utility of daily OCT-otoscopy and microbiology in children who have presented to primary care with suspected AOM. Specifically, the objectives are:1. To systematically review the literature for evidence regarding the utility of OCT and serial microbiology in children and adults with respiratory tract infections
2. To establish parental acceptability of the study design (consent rate)
3. To record child and parental acceptability of daily serial middle ear fluid measures (OCT-otoscopy) and microbiology (nasal swabs)
4. To explore the association between quantitative OCT image signal changes for any middle ear contents present and ear pain between presentation and symptom resolution
5. To explore quantitative changes in bacterial/viral load and ear pain between presentation and symptom resolution.

MethodStandard methods will be used to review the literature for relevant evidence. For the cohort study, the student will adapt methods employed successfully in the past,(6) (7) to assemble a cohort of 100 children with AOM who have recently presented to primary care. Recruitment and follow up will be according to the following steps:1. GP/practice nurse requests parental permission to notify study centre of potentially eligible children (following face-to-face or ‘COVID secure’ telephone assessment)
2. Student contacts parent to confirm interest in, and eligibility for, the study
3. Student visits parent/child (at place of parent’s choosing – usually the family home)
4. Student confirms consent and willingness of parent to receive daily visits
5. Student conducts bilateral OCT-otoscopy and takes nasal swab, and advises parent in the use of the daily symptom diary (validated,(8) and as used in previous studies.)(2) (6)
6. Student visits daily until symptom resolution (usually no more than eight days).(9)

ImpactCurrent OtoSightTM costs prohibit its use in routine clinical care but results will be used to inform an NIHR EME application to conduct a mechanistic RCT comparing glycerol and anaesthetic ear drops. |
| Training and development provision by host: |
| *Formal training:* A plan will be informed by an analysis of the academic needs of the PhD candidate carried out in the first month. Training will be directed towards helping the candidate develop as an independent researcher, as well as towards the needs of the PhD project.  |
| *Informal training:* The student will be offered mentorship from a senior primary care academic working in an external institution, meeting twice a year. Mentors receive formal training, developed by the Society for Academic Primary Care, to ensure independence and appropriate support. The student will also have access to informal mentoring from senior members of the collaboration at an annual training meeting, and to participate in doctoral exchange programmes. |
| *PPIE:* Costs are included for a PPI panel of two people (from our NIHR EME funded RAPID-TEST RCT) to meet three times to provide advice and guidance on the PhD. They have already indicated the research area is important and that alternatives to anaesthetic ear drops and antibiotics for AOM are welcome. |