Reviewer's report

Title: Assessment of the feasibility and coverage of a modified universal hearing screening protocol for use with newborn babies of migrant workers in Beijing

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Reviewer: Peter Watkin

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A modified UNHS for migrant workers in Beijing
Beier Qi et al

Thank-you for giving me the opportunity to review this paper, and for enabling me to gain an insight into the UNHS in Beijing. Screening the hearing of migrant populations is an important health issue, but is taxing, difficult and frustrating and I commend the effort made and the reporting of the results.

1) The Title of the paper and the question posed by the authors

As the title of the paper conveys the report addresses the feasibility of employing a neonatal OAE hearing screening programme with 4 stages to reduce the screen attrition rate that has been achieved by a traditional two stage OAE screen being implemented for the population of Beijing. The problems with attaining high screen coverage in the migrant population are well described in the report.

2) The Structure of the Report

The four stages in the modified screen protocol are explicitly detailed in the Methods and the Figures. The attrition rate and the benefit in terms of increasing the number of screen negatives that can be discharged into the Child Health care system, and reducing the number of screen positives needing onward referral, are available from the Results and Figure. The yield of congenital hearing impairment identified by the programme from the cohort by degree of impairment is provided in the Results and a Table. The Discussion presented the reasons why increasing coverage is important and the problems of achieving this in a migratory population and Concluded that increasing the number of screening opportunities available in the programme pathway achieved the aim of the protocol modification.

This was an informative and well written and readily understandable report. Revisions of this draft are however required.

3) Major Compulsory Revisions central to the report.

There are several major points that require further consideration and are pivotal to the entire report.
a) The Aim of the screen was nowhere explicitly stated. Those with a >30 dB nHL ABR constituted the yield. Although most UNHS screens in Europe aim to identify babies with a moderate or worse permanent congenital deafness (because early identification and management of these cases is considered to offer the greatest benefit), some screens in the USA do indeed target hearing impairments of >30 dB nHL (summaries usefully tabulated in the Task Force Reviews of 2001 and 2008). However despite the mildness of the targeted condition, the aim of such screens is never-the-less to identify permanent childhood hearing impairment (PCHI) and although you report that cases of SNHL were referred for intervention, and you also discuss a screen yield of SNHL cases, the aim of your UNHS is not explicitly stated in your paper.

b) The Aim is important because I was unsure from your report that you were identifying cases of PCHI as your true positives. This is exemplified in your table. I have addressed my concern about your ability to identify whether a temporary conductive loss was causing or contributing to the impairment in my review of your Methods.

c) This lack of aim also confused your description of the OAE positives. Throughout the text of the paper you describe OAE screen positives as having a hearing impairment. You don’t detail whether a unilateral OAE fail constituted a screen positive. You discuss the contribution of false positives, but because of the high false positive rate found in all OAE screens undertaken within the first 48 hours your screen fails cannot properly be described as having a hearing impairment. Interestingly you attribute misplaced significance to your high screen positive rate following the initial OAE screen in your programme. It is exactly the same as the rate I reported from my early TEOAE screen implemented 20 years ago and also from the Rhode Island Project (Karl White et al, Seminars in Hearing, 1993). At that age and using an OAE screen, a high false positive rate is predictable. It is to improve the specificity that many programmes have now introduced AABR as the second stage.

4) The Methods and the effect on the Data

The programme and its modifications are well detailed and I found the figures extremely useful. The TEOAE screening test is adequately described. However I’m afraid that I found some parts of the Methods required Compulsory Revision.

a) The description of the ABR was inadequate. To be able to assess the accuracy of the diagnostic assessment outcomes we need details of the filter settings, stimulus repetition rates, number of responses averaged and the ways you confirmed the validity of an ABR response. In addition details of stimulus calibration are useful – so that cross site comparisons can be made. There is also a confusion in your text about the use of clicks at frequencies from 2000Hz to 4000Hz. Clicks of course have a wide spectral waveform, but many studies have demonstrated that they correlate clinically with hearing thresholds from 2 to 4 kHz. I’m sure that these revisions can be readily addressed by the team.

b) My most significant concern is about your ability to diagnose the presence of
PCHI – which has an important bearing on your yield data. How did you identify the presence of a PCHI – or the absence of a middle ear component to the impairment? Did you use Bone Conduction ck-ABR? Did you use high frequency (1000Hz) tympanometry? Did you use Latency Intensity Functions (LIF wave V)? If you simply used ck-ABR and TDH headphones without excluding the presence of effusions – and without long term follow up with behavioural confirmation - the yield data becomes very difficult to interpret. The children identified with a hearing impairment by your programme are now aged 3 years to 6 years. Can you underpin your yield by their subsequent behavioural assessments – or does the migratory nature of the cohort prevent this?

c) A minor error is that you have defined the degrees slightly differently in the Methods text and the Table.

5) The Discussion and Drawing Conclusions from your Data

The discussion was interesting with good reference to the literature. There were some areas that I thought may benefit from Discretionary Revision.

a) I wondered why you would want to start the Background to your paper by justifying the implementation of a neonatal screen by referring to the psychosocial consequences of presbyacusis (ref 1) and the mental health of post-lingually deaf patients receiving Cochlear Implants (ref 2). More relevant studies underpinning the need for early detection of pre-lingual congenital deafness are summarised in such the US Task Force Reviews (including the American Academy of Paediatrics) as well as the UK NHS Critical Review (HTA 1997).

b) The success of your programme ultimately depends upon the yield of children obtained with a PCHI. Although you consider that the yield from the migratory population of Beijing was high, in fact if those with a mild assumed PCHI are removed because of diagnostic uncertainty, then the yield of bilateral moderate and worse PCHI is 0.36/1000 and whilst clearly this is a very worthwhile yield for these difficult to track children and their families - it is low with 95% CIs 0.01 to 0.72 (as stated in your Background – it is usually around 1/1000 or even higher in sub-populations with greater health care needs.

c) I also questioned the value of the 4th OAE. I understand entirely why this was done – offering a non-attending population an additional point of contact to have the test done – and this was a very reasonable hypothesis. But was it effective? The second in patient OAE clearly was – with 57% of those receiving the second OAE passing – but of 141 who received the 4th OAE almost 75% failed. The referral rate for ABR was only reduced by 0.35%. Was it really worth implementing the second out-patient OAE – or would you have achieved a higher yield by immediately arranging and pursuing ABR on those 228 that failed the initial OAE out-patient test?

d) A minor error is the 4th box from the bottom Figure 3
Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests