



Review article

Follow-up in newborn hearing screening – A systematic review



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ABSTRACT

Introduction: The quality and efficiency of newborn hearing screening programs (NHS) rely heavily on appropriate follow-up. The Joint Committee on Infant Hearing recommends a follow-up rate of more than 95% of infants who fail the initial hearing screening. However, a 70% benchmark is considered to be more feasible. This high loss to follow-up (LTF) rate acts as a threat to the overall success of NHS programs. The objective of the study was to identify and examine the reported rates of LTF, attributed reasons for LTF and strategies undertaken to reduce LTF.

Methods: Using a systematic search, articles published between 2005 to December 2015 were identified from PubMed/Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Educational Resources Information Center (ERIC), Scopus, Ovid, ProQuest, and Cochrane Library. To be included in the review, the study should be exploring the loss to follow-up or drop-out rate in newborn hearing screening programs and be published in an indexed peer-reviewed journal in the English language. The main outcome measures were overall rate of LTF, factors leading to LTF and measures adopted to overcome LTF.

Results: 53 articles were short-listed for data extraction. Out of these, 27 were single-centre studies, 19 were multi-centre, 3 compared multiple databases, and 4 used survey-based methods. Overall LTF rates of 20% in single-centre and 21% in multiple-centre studies were observed. Educational disparity and lack of adequate knowledge among parents were associated with LTF. The most commonly used strategy to overcome LTF suggested by studies was the use of an adequate data management system.

Conclusion: This review is a novel attempt to explore the LTF among NHS studies, reasons for LTF and strategies to reduce LTF. This review can act as a basis for planning and execution of effective NHS programs.

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1. Introduction

According to the estimates provided by the World Health Organization (WHO), approximately 7.5 million children in the world have a disabling hearing loss. At least 80% of these children live in low to middle-income countries [1,2]. In the absence of timely support and intervention, these children may experience lifelong difficulties in speech and language as well as complications in educational and vocational achievements [3–5].

Universal Newborn Hearing Screening (UNHS) has enabled early identification of infants with congenital or early onset hearing loss [6,7]. Multi-stage screening protocols incorporate tests such as Oto-Acoustic Emissions (OAE) and Auditory Brainstem Response (ABR). The quality and efficacy of the UNHS program rely heavily on overall coverage percentage, quality of testing and reporting, and timely referrals for diagnostic tests, interventions and follow-up [8]. Follow-up of infants who have failed hearing screening is essential in order to reap maximum benefits from the program. Timely follow-up promotes early access to comprehensive diagnostic services and management options for the infants detected with hearing loss and their families. The Joint Committee on Infant Hearing (JCIH) has recommended the 1–3–6 rule for monitoring follow-up [6]. Under this goal, newborn hearing screening should be completed before the infant turns one month of age, complete diagnosis of hearing loss by three months of age and the child with hearing loss should be enrolled for early intervention before six months of age.

The JCIH recommends a follow-up rate of more than 95% of infants who fail the initial hearing screening [9]. Prievé et al. [10] have suggested a 70% benchmark to be more feasible. However, one of the major challenges of existing programs is the poor follow-up rate in infants who have failed the initial UNHS and have been referred for further testing (referred to as ‘lost to follow-up’ or LTF) [11]. The issues related to LTF are present widely across programs, be it in the USA which has the most established UNHS programs or in low to middle-income countries which have recently commenced screening programs. In the USA, health care providers have frequently reported of poor compliance for follow-up testing of infants referred from screening [12,13]. Several contributors to LTF at each level have been identified which include: limited access to professionals, time constraints, and other co-morbid conditions [14–18]. Olusanya [19] reported issues related to LTF in low to middle-income countries to be commonly the result of logistic constraints, cost issues, poor infrastructure, and lack of appropriate patient data management and tracking systems.

The overall aims of the present systematic review were to identify and examine the reported rates of LTF, contributors to successful follow-up, attributed reasons for LTF, and strategies undertaken to reduce LTF.

2. Method

The review was carried out based on the guidelines of the Preferred Reporting Items for Systematic Review and Meta-analyses statement (PRISMA).

2.1. Eligibility criteria for type of studies and participants

The published literature was systematically searched based on a search strategy. The search was limited to English-language studies published during 2005 to December 2015. For the purpose of the present review, loss to follow-up (LTF) was defined as the percentage of infants that did not present for the second stage of newborn hearing screening after receiving a refer result in the initial screen. Only those studies reporting primary data based on a newborn hearing screening program were included. Studies that provided an overview or a review of more than one program were excluded, as were opinion and commentary pieces. There was no criteria set for the study design in order to include a maximum number of studies. Studies carried out both in normal and high risk populations were included, as were those using targeted rather than universal screening.

2.2. Literature search

The literature search was carried out in February 2016. The search was completed using the following electronic databases: PubMed/Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Educational Resources Information Center (ERIC), Scopus, Ovid, ProQuest, and Cochrane Library. The keywords such as ‘newborn hearing screening’, ‘universal newborn hearing screening’, ‘follow-up’, ‘oto-acoustic emission’, ‘auditory brainstem response’ were used to develop search strings as per the requirements of the database using Boolean operators such as ‘AND’, ‘OR’ ‘NOT’. The search string of the PubMed database has been attached as [Appendix A](#).

2.3. Study selection

The search was carried out independently by two authors across all the electronic databases. The studies obtained were compiled together using a reference management system and the duplicates were eliminated. After removal of duplicates, the authors independently screened the titles. After title screening, the abstracts were screened by both the authors. Verbal discussion was used to solve any difference of judgements at any stage. The full-length text of the shortlisted abstracts was obtained for the data extraction procedure.

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