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Title

Analysis of Newborn Hearing Screening Program in Iran

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Abstract

Introduction: One of the most significant threats to the health system in recent decades is the hearing impairment in newborns. In terms of the overall burden of diseases, hearing impairment accounts for 6.8% of the total disease burden and is the third leading cause of disability-adjusted life years (DALYs). Failure to identify and intervene in hearing impairment in a timely manner results in loss of productivity in countries. Therefore, this study aimed to analyze the newborn hearing screening program in Iran.

Methods: This research was conducted using a mixed-methods approach and triangulation method in two phases. The first phase included qualitative analysis using the CIPP evaluation model, while the second phase consisted of a cost-effectiveness study based on data from the year 2021 (1400 in the Iranian calendar). In the first phase, semi-structured interviews were conducted with 40 managers and experts involved in the program at the Ministry of Health and Medical Education (9 individuals), the State Welfare Organization (8 individuals), audiologists (7 individuals), ENT specialists (4 individuals), pediatricians (4 individuals), a nursing manager (3 individuals), and related program officials (5 individuals) in healthcare centers and rehabilitation clinics. This qualitative study aimed to analyze various aspects, including the context, input, process, and output of the neonatal hearing screening program. A snowball sampling method and maximum diversity sampling were used. For the analysis of interview data, a directed content analysis approach with a deductive method was employed. The second phase included a cost-effectiveness study in which costs were collected using a checklist, and prevented Disability-Adjusted Life Years (DALYs) were considered as outcomes. This study, based on data from the year 2021, compared three strategies: OAE+AABR, OAE, and no intervention. For the first phase, MAXQDA version 2022 software was used, and in the second phase, the cost-effectiveness analysis was conducted from the health system perspective and a lifetime horizon using TreeAge version 2022 software.

Results: In this study, through interviews with experts, the management components of the newborn hearing screening program were presented in four main dimensions of the CIPP model. Context: Subcategories included conducting pilot studies, proper needs assessment, enhancing organizational culture, considering ethics and confidentiality, existence of policies and laws, protocols and guidelines, appropriate programs, goals, and indicators, prioritizing services, and epidemiological examination of the disease. Input: Subcategories included matching the number of personnel with service volume, appropriateness of physical structure and equipment, allocation and payment of suitable budgets. Process: Subcategories included identifying stakeholders and comprehensive cooperation, comprehensive education in screening, diagnosis, timely therapeutic interventions, and follow-up, appropriate decision-making system, updating educational curriculums, providing continuous and active services, communication between service levels, documentation, and attention to personnel motivation. Output: Subcategories included the presence of an appropriate evaluation system, continuity in evaluation, updating the evaluation process, and suitable evaluation indicators. The results also showed that the OAE plus AABR strategy had the highest cost-effectiveness and recommended this approach as the dominant strategy, followed by OAE alone. Sensitivity analysis confirmed the cost-effectiveness of OAE+AABR.

Discussion and Conclusion: This study showed that in the context dimension, the main challenges included the lack of appropriate policies and regulations and insufficient needs assessment. It is recommended to address these issues by formulating precise policies and regulations and conducting comprehensive needs assessments. In the input dimension, the main challenges included a shortage of human and financial resources. Allocating appropriate budgets and increasing the number of personnel is recommended to address these issues. In the process dimension, the main challenges were the lack of stakeholder cooperation and comprehensive education. Strengthening cooperation and providing more comprehensive education can address these issues. In the output dimension, the main challenge identified was the lack of an appropriate evaluation system, for which creating an efficient and continuous evaluation system is recommended. The use of the combined OAE + AABR strategy for newborn screening is introduced as the most effective and cost-effective method. This combination, due to the simultaneous implementation of two tests, provides a more accurate and comprehensive identification of hearing problems. Implementing this approach is emphasized as an initial step for the early identification and prevention of the progression of hearing impairment in Iranian newborns.

Keywords: Newborn Hearing Program, Screening, Cost-Effectiveness, Qualitative Study, CIPP Model.