

Screening infants for hearing impairment in Canada

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Recent shifts in policy have resulted in universal screening programs for infant hearing in six Canadian provinces. These changes are in no small part due to advocacy efforts by the Canadian Paediatric Society, the Canadian Hearing Society, Speech-Language and Audiology Canada, and other advocacy groups. However, Canada lags behind other developed countries because it lacks a national screening program covering all of its provinces and territories.¹ Both the United States and the United Kingdom have coherent national targets to screen more than 95% of their newborns.¹

Hearing loss is a common disorder in newborns. The prevalence of severe to profound (> 70 dB) bilateral hearing loss in newborns is 1–3 per 1000.² With the inclusion of patients with moderate (> 40 dB) bilateral hearing loss, the prevalence would at least double.² This means that about 2000 Canadian children will be born with clinically meaningful hearing impairment each year. This rate is alarming, and we feel it is sufficient to require a universal screening program.

A delay in diagnosis and intervention can have an important and permanent effect on a child. For infants with impaired hearing, early intervention (age ≤ 6 mo) has beneficial effects on language acquisition, and late intervention (age > 12 mo) delays acquisition of language, often permanently.³ Moreover, studies from more than 10 years ago suggested that infants who received late rehabilitation had lower cognitive quotient scores than those who received early rehabilitation. Screening and early referral for infants with hearing loss has been shown in a

population-based longitudinal study to diminish educational and societal costs.⁴ Thus, a Canadian policy statement recommends screening by one month of age either in hospital or in a community-based setting, confirming the hearing loss by three months of age and implementing an intervention by six months of age.¹

Accurate diagnosis has to be made for screening to be effective. Screening for infant hearing is reliably done with the use of two portable, inexpensive and automated electrophysiological tests: otoacoustic emission and auditory brainstem response. Based on a study involving 4911 newborns, these screening tests, used independently, have a sensitivity of 90%–100% and a specificity of 94%.⁵ Most screening programs for infant hearing use the otoacoustic emission test followed by the auditory brainstem response test if the first test fails, thereby increasing the sensitivity and specificity to nearly 100%.⁶ Although the test equipment is relatively inexpensive, implementing these tests as part of a universal program is costly, at \$35 per newborn.¹

Because it is considered cheaper than universal screening, risk-factor screening has been implemented in some Canadian provinces. Screening based on risk factors (e.g., admission to a neonatal intensive care unit, congenital or craniofacial anomalies, and hyperbilirubinemia) misses as many as 50% of infants with substantial hearing loss and identifies infants with hearing loss at a later age.⁷

Studies have been done on the cost-effectiveness of universal screening compared with not screening or risk-factor screening only.⁸ Many of these studies predate data on long-term educational and societal savings, and therefore underestimate the benefits of universal screening.^{4,8} More recently, universal screening has been described as potentially cost-saving.^{4,9} There is a substantial increase in costs at seven to nine years of age for children with impaired hearing compared with those with normal hearing.^{4,9} Costs were related to receptive language abilities, with a 15% reduction in costs in the preceding year of life associated with children who were identified by universal screening.^{4,9} Cost-effectiveness studies comparing universal and risk-factor screening have not yet incorporated

KEY POINTS

- Canada lags behind other developed countries because it lacks a national program to screen infants for hearing impairment.
- An estimated 2000 Canadian children will be born with clinically meaningful hearing impairment each year.
- A delay in diagnosis and intervention can have an important and permanent effect on a child.
- Universal screening for infant hearing is accurate and effective, and evidence suggests that it is ultimately cost-saving.
- All health care providers in Canada should advocate for universal screening.

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educational and societal costs accrued when an infant receives rehabilitation at an early age. However, it has been hypothesized that universal screening would be cost-saving compared with risk-factor screening alone should new data about long-term additional costs be incorporated into analyses.^{4,9} A cost-benefit analysis, taking into account later societal effects, has shown that universal screening is cost-saving.¹⁰

Canadian cost-effectiveness analyses have been unable to demonstrate the exact dollar value per quality-adjusted life-year for universal screening, largely because long-term data on quality of life and costs are unavailable. However, given the previous evidence of cost savings,^{4,9,10} such a study would not add much to the literature. As a society, we have agreed to fund lung transplantation in Canada, despite its high cost, because it is considered worth the cost. Yet we have not implemented universal screening for infant hearing in all of our provinces and territories despite evidence that it is cost-saving.

After a lengthy legislative stalemate, Manitoba passed a bill in 2013 to make it the sixth province, along with British Columbia, Ontario, Nova Scotia, New Brunswick and Prince Edward Island, to provide a universal screening program for infant hearing. Before this bill, as in many other parts of Canada (e.g., Quebec, Alberta, Saskatchewan, and Newfoundland and Labrador), Manitoba either had no screening for infant hearing or screened only newborns deemed to be at high risk.¹ Quebec had aimed to implement universal screening by the end of 2013, and Alberta has recently promised an investment into such a program.^{11,12} This is an impressive response by policy-makers to the efforts of advocacy groups. Three years ago, few provinces had universal programs in place.¹

An excellent resource that lists the type of programs currently available by province and the link to each program can be found on the Speech-Language and Audiology Canada website (http://sac-oac.ca/system/files/resources/Report%20Card-2014_EN.pdf). The efforts of certain advocacy groups will surely continue, but this is not enough. All health care providers in Canada should advocate for universal screening for infant hearing. They should also consider the possibility of hearing loss when examining newborns and infants, educate parents on this issue and refer infants with possible hearing loss to appropriate screening centres in a timely fashion.

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