Ontario Infant Hearing Program:

program overview, implications for physicians

by Martyn L. Hyde, PhD
Jacob Friedberg, MD, FRCSC
David J. Price, BSc, MD, CCFP
Stacey L. Weber, MSc. Aud. Reg. CASLPO

Each year in Ontario, approximately 300 children are born with, or acquire, significant, permanent hearing impairment (PHI). A new provincewide initiative — the Ontario Infant Hearing Program — aims to address the needs of these infants and their families.

The following article outlines the purpose and nature of the Ontario Infant Hearing Program (IHP), key program components, and important implications for physicians.

A second article, to be published in a future edition of the *Ontario Medical Review*, will discuss, in detail, the medical management of infants with hearing impairment.

The goal of IHP is to identify every infant with permanent hearing impairment, and provide family members with the information they require to make timely, informed decisions, and the services needed to maximize their child's communication development.

IHP is funded entirely by the Ministry of Health and Long-Term Care (MOHLTC) Public Health division, and is independent of OHIP.

IHP is a comprehensive system that replaces the former patchwork of services for hearing impairment in early childhood. There is clear evidence that those services led to late identification, and less than optimal communication development for many children.

Many services were based on procedures that are now known to have significant limitations, and many children were not identified with impairment until the age of three years or more.

IHP provides:

i) Universal newborn hearing screening.
ii) Re-screening of high-risk infants.
iii) Definitive audiologic assessment.
iv) Referral for medical assessment of infants with a definite impairment.
v) Information and support for families.
vi) Amplification prescription and verification.
vii) Service options to enhance language development.

The objective is to reach step (vii) by six months of age, wherever feasible.

All IHP services are provided automatically. They do not include medical surveillance for late-onset or acquired impairment, or medical management of infants with proven impairment. To optimize the system, these medical actions need to take place as promptly as possible.

Routes into IHP services

Hearing screening of *all* newborns by objective, physiologic screening tests is now provided across Ontario. It is impossible to detect all PHI accurately and promptly by any other method. Also, targeted newborn screening restricted to babies at risk will miss as many as half of all babies with PHI, because they have no currently identifiable risk indicator.

The second route is re-screening of high-risk infants, to detect progressive or late-onset PHI. Infants at very high risk, such as those with severe hyperbilirubinemia or severe anoxia neonatally, are re-tested repeatedly in

the first year. Those at lesser risk are re-screened at about one year. All screening and non-medical follow-up is implemented without referral by a physician.

The third route is referral to the IHP by a physician or audiologist, of infants who present with post-natal risk for PHI. This may occur, for example, due to bacterial meningitis, serious head injury, or hearing-related developmental concerns. These infants will usually have received a hearing test that indicates probable PHI, prior to referral into IHP.

IHP is focused on permanent hearing impairment, and is *not* an alternate provider of audiology services for children with temporary middle-ear disorders.

Role of physicians

IHP complements and augments physicians' traditional efforts. The program ensures automatic access to audiologic assessment and intervention services over a period of up to three years. IHP is not an alternate provider for acute medical care, but the linkages to such care are crucial.

The following is a listing of key physician activities that will facilitate an overall system of care that is maximally effective and efficient:

1. *Reinforce to families the importance of early identification and communication development, and encourage families to follow recommended IHP procedures.*

Despite the best efforts of IHP personnel, families may not fully understand or accept the need to attend IHP appointments, especially for missed screens, re-screens and audiologic assessments.

Drop-out and loss to follow-up are a major, potential factor limiting successful delivery of services. Physicians may improve follow-up integrity significantly by inquiring about hearing status at all routine, clinical encounters with young infants, and by encouraging families to follow IHP recommendations.

One challenge is to reduce family anxiety after a positive screen, yet to secure attendance for assessment. The crucial message is that a positive screen *does not* mean that the baby has impaired hearing, but it *does* mean that attendance for recommended re-screening or definitive audiologic assessment to rule out, or quantify, impairment is imperative.

2. *Maintain a high alertness to conditions that may cause PHI, and make prompt referrals for hearing testing and intake into IHP, for children under two years.*

Primary care physicians need to be fully aware of the many conditions that confer risk of progressive, late-onset, or acquired PHI.

For example, in particular, infants with bacterial meningitis should be fast-tracked to audiologic assessment as quickly as possible after recovery.

Other infants deemed by a physician to be at high risk for PHI should be tested audiometrically to determine the presence of PHI, before referral into IHP.

Children with hearing loss attributable to middle-ear disease should not be referred to IHP, unless there is a strong suspicion of a PHI component.

Referral into IHP is normally by phone to the relevant IHP regional co-ordination centre, listed in Appendix A (page 30). Queries and concerns about IHP services should be directed to the same centres.

3. *Attend as promptly as possible to infants referred from the IHP because of PHI.*

All infants identified with PHI must be assessed medically. The medical objectives are to assess possible etiologies, identify concomitant disorders, and detect any conditions such as any of several syndromes of significance for management and/or prognosis.

In most cases, these etiologic investigations need not delay IHP rehabilitation procedures, unless there is a specific, significant contraindication to non-medical management of the PHI.

4. *Promptly manage referrals from the IHP with conductive impairment.*

If there is significant conductive impairment, IHP will identify it. It may be the only impairment, or possibly an overlay on PHI (a mixed hearing loss).

Conductive overlays can complicate measurement of the true PHI, cause delay in management, such as fitting of amplification, or compound the child's functional difficulties substantially.

In such situations, it is especially important to act as promptly and definitively as possible, to treat the conductive disorder, and to facilitate the further IHP process.

Specific IHP procedures

All IHP procedures are standardized provincially, with obligatory, evidence-based protocols. All personnel providing IHP services must be hired or contracted by the Regional IHP administration. Persons who have not received training specified by the IHP are not eligible to provide services within the program funding.

Newborns in well-baby nurseries (about 85 per cent to 90 per cent of births) are screened with automated oto-acoustic emissions (AOAE) before hospital discharge.

This simple, quick, objective, physiological test detects hearing impairment of 35 decibels hearing level (dBHL) or more with a sensitivity and specificity of about 85 per cent.

The test uses a sensitive microphone and computer processing to measure faint sounds in the ear canal that are generated when the normal cochlea is stimulated by controlled sounds.

Babies who have an AOAE screen that is positive for hearing impairment receive a second screen by automated auditory brainstem response (AABR), a procedure based on evoked brain potentials, before hospital discharge, or in community screening centres. This test is more accurate, but more expensive and complex, than AOAE.

Babies who screen positive on AABR have a second AABR after a month. This minimizes overall false-positive screens, which cause family

anxiety, and consume follow-up resources. Babies screening positive on the second AABR automatically go on to detailed audiologic assessment.

Babies from neonatal intensive care units (NICUs), and those who are otherwise at risk for PHI (for example, due to a family history of childhood hearing impairment, or to craniofacial anomalies), are screened by AABR, and those who screen positive go directly and automatically to detailed audiologic assessment. About one per cent to two per cent of babies at risk have PHI, which is about 10 times the prevalence in the much larger group not at risk.

Any babies, either from the well-baby nursery or the NICU, who are missed in hospital, can access the appropriate screening in community clinics. This appointment is made automatically, if the parent gives consent before leaving hospital.

Audiologic assessment in IHP is targeted to occur at two to three months corrected age. Generally, assessment at that time is more accurate and relevant than during the neonatal period, because of rapid ear development and possible changes in expression of hearing disorders. Families may need reassurance that the delay before detailed assessment is appropriate.

The IHP audiologic assessment protocol is state-of-the-art. These tests can usually determine the audiogram and the type of impairment in each ear, in sufficient detail for all subsequent management options. *It is emphasized that accurate, objective, detailed audiometry is now practicable in most young infants, prior to six months of age.*

Infants with confirmed PHI are referred for medical assessment, initially to the primary care physician, where available. The medical assessment of PHI must include evaluation by an otolaryngologist, and wherever practicable, by one with pediatric experience. Infants with conductive impairment are usually referred to a primary care physician for management.

Families of infants with PHI receive essential psychological support and evidence-based, unbiased information about communication development options, from specially trained family support workers.

The family is encouraged and supported to make informed choices among options such as amplification, auditory-verbal therapy, sign language training, or a combined approach. All of these services have been strengthened and made more accessible.

Results to date

IHP has an extensive infrastructure and sophisticated information systems to track individual infants, cue required procedures and detect delays, and record procedural outcomes for program evaluation, quality improvement, and statistical reporting.

As of the end of June 2003, approximately 82,000 newborns had been screened under IHP. Among them, 130 babies were found to have significant, permanent hearing impairment, five received cochlear implants, 53 received hearing aids, and 52 were enrolled in various types of follow-up language development services.

When IHP is fully implemented, it is expected that at least 120,000 neonates will be screened per year.

The evidence-based methods, consistency and quality of procedures, and family-centered care have already led to international recognition of the Ontario IHP as a model program.

Information sources

Further information about IHP is available online (www.health.gov.on.ca/english/public/program/child/hearing/hearingmn.html).

Comparable programs are now implemented in more than 40 U.S. states, where they are known as Early Hearing Detection and Intervention (EHDI) programs.

Detailed information on all aspects of the U.S. programs is also available online (www.infanthearing.org), and from the American Academy of Pediatrics (www.aap.org). **OMR**

Martyn L. Hyde, PhD, is director of research and development, otologic function unit, Mount Sinai Hospital, Toronto, professor of otolaryngology and public health sciences, University of Toronto, and consultant, Ontario Infant Hearing Program.

Jacob Friedberg, MD, FRCSC, is an otolaryngologist, department of otolaryngology, Hospital for Sick Children, Toronto, and professor, department of otolaryngology, University of Toronto.

David J. Price, BSc., MD, CCFP, is director, Maternity Centre of Hamilton and Stone Church Family Health Centre, and assistant professor, department of family medicine, McMaster University, Hamilton.

Stacey L. Weber, MSc. Aud. Reg. CASLPO, is a program consultant — Speech Language Pathology and Audiology, Ministry of Health and Long-Term Care.

(continued on page 30)

Appendix A

Infant Hearing Program Regional Co-ordination Centres

Windsor-Essex and Kent-Chatham
Contact: "Talk 2 Me"
Windsor Regional Hospital
Telephone: (519) 254-5577, ext. 52595

Middlesex, London, Oxford, Elgin-St.Thomas, Sarnia-Lambton, Huron-Perth and Grey Bruce Owen Sound
Contact: "TykeTALK"
Middlesex-London Health Unit
Telephone: (519) 663-5317, ext. 2224

Hamilton-Wentworth, Niagara, Brant and Haldimand-Norfolk
Contact: "Early Words"
Affiliated Services for Children & Youth
Telephone: (905) 385-7927, ext.227
Toll-Free: (866) 826-4327, ext.227

Peel, Halton, Waterloo, and Wellington-Dufferin
Contact: "Erinoak Serving Young People with Physical Disabilities"
Telephone: (905) 855-2690
Toll-Free: (866) 764-9606
TTY: (905) 855-4925

City of Toronto
Contact: "Toronto Preschool Speech & Language Services"
Telephone: (416) 338-8255
TTY: (416) 338-0025

Simcoe County and Muskoka-Parry Sound
Contact: "Children's Rehabilitation Services"
Royal Victoria Hospital of Barrie
Telephone: (705) 739-5696
Toll-Free: (800) 675-1979

York Region, Durham, Haliburton, Kawartha, and Pine-Ridge
Contact: "Beyond Words"
Markham Stouffville Hospital
Telephone: (888) 703-5437
TTY: (905) 762-1350

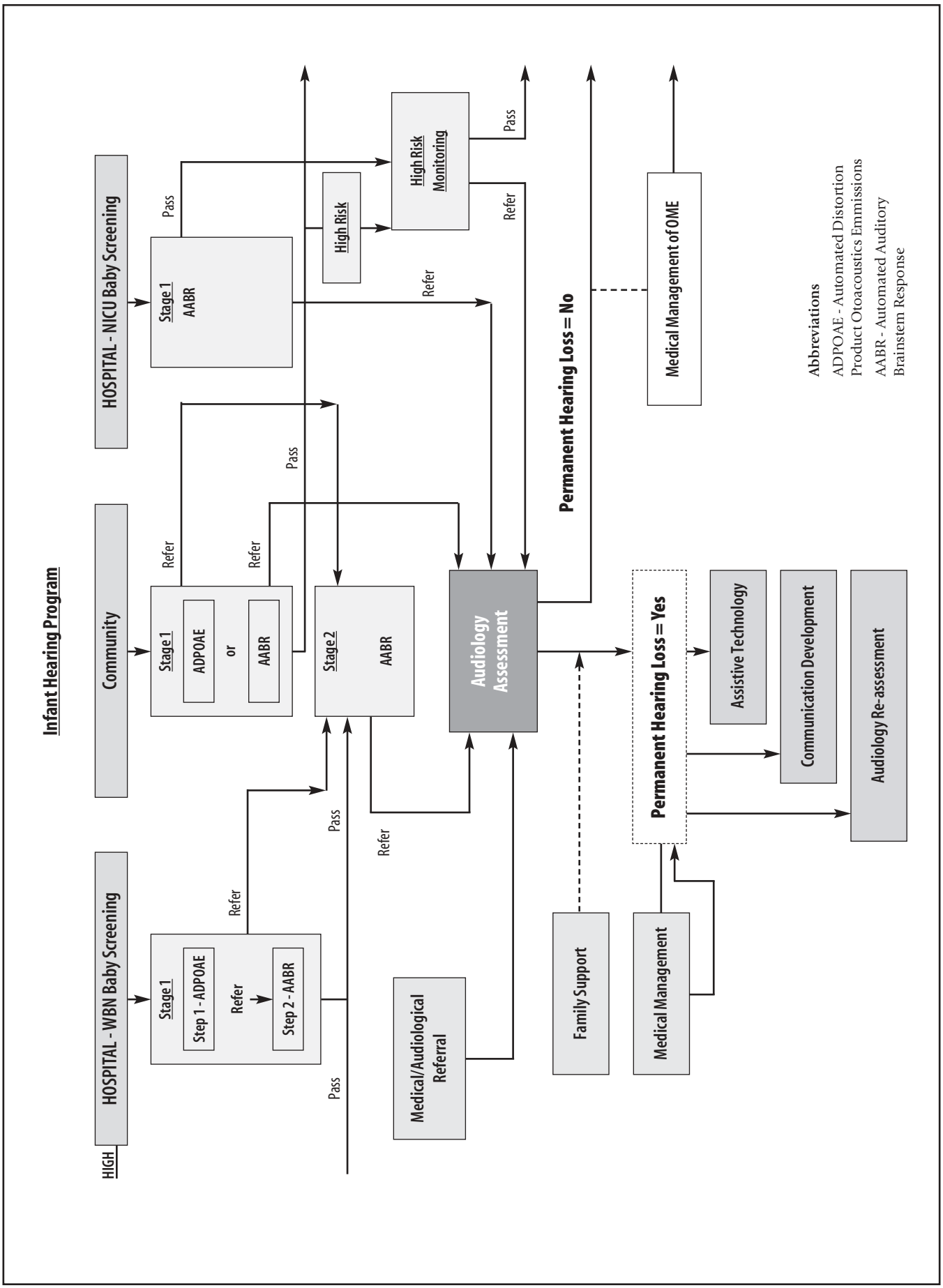
Kingston, Frontenac, Lennox and Addington, Leeds, Grenville and Lanark and Hastings Prince Edward
Contact: "Baby Talk"
Kingston, Frontenac and Lennox & Addington Health Unit
Telephone: (613) 549-1154
Toll Free: (800)-267-7875, ext. 565
TTY: (613) 549-7692

Ottawa, Renfrew County and District, and Eastern Ontario
Contact: "FirstWords"
Pinecrest-Queensway Health & Community Services
Telephone: (613) 820-4922
TTY: (613) 820-7427

Manitoulin-Sudbury, Algoma, Cochrane and Nipissing-Timiskaming
Contact: "Wordplay/Jeux de Mots"
Northeast Mental Health Centre
Telephone: (877) 522-6655

Thunder Bay
Contact: Thunder Bay District Health Unit
Telephone: (807) 625-5922
Toll-Free: (888) 294-6630, ext. 5922

Kenora Rainy River
Contact: "North Words"
Northwestern Health Unit
Telephone: (877) 553-7122


Infant Hearing Program
HIGH
HOSPITAL - WBN Baby Screening
Stage 1
Step 1 - ADPOAE
Refer
Step 2 - AABR
Refer
Pass
Pass
Community
Stage 1
ADPOAE
or
AABR
Refer
Refer
Pass
Stage 2
AABR
Refer
HOSPITAL - NICU Baby Screening
Stage 1
AABR
Pass
High Risk
High Risk
Monitoring
Pass
Refer
Refer
Audiology
Assessment
Permanent Hearing Loss = No
Medical Management of OME
Medical/Audiological
Referral
Family Support
Medical Management
Permanent Hearing Loss = Yes
Assistive Technology
Communication Development
Audiology Re-assessment
Abbreviations
ADPOAE - Automated Distortion
Product Otoacoustics Emmissions
AABR - Automated Auditory
Brainstem Response