

Audiology
Clinical
Practice
Algorithms
and
Statements

Communication disorders are among the commonest of disabling conditions in the population of the United States. Problems affecting hearing, speech, and/or language are estimated to affect 10-15% of the populace, and the number of people with such problems increases as the population ages. To take but one example, 20-26 million U.S. citizens have hearing loss.

In 1996 and 1997, three major national organizations whose membership is comprised of or includes audiologists and speech pathologists, professionals who deal with hearing, speech, and language problems, began exploring ways to make clinical services and clinical decision making provided by their members more effective. This was done in the context of the efforts by the Agency for Health Care Policy and Research, U.S. Department of Health and Human Services, to enhance the quality, appropriateness, and effectiveness of health care services and access to such services.

The three organizations—the American Speech-Language-Hearing Association (ASHA), the American Academy of Audiology (AAA), and the Department of Veterans Affairs (VA)—are officially incorporated or defined agencies whose memberships encompass virtually all board-certified public- and private-sector audiologists and speech-language pathologists in the United States. In addition, the VA is the largest single employer of such professionals in the nation. Although each of these organizations and many smaller and/or affiliated groups has made attempts in the past to look at quality, effectiveness, and appropriateness of the clinical services provided by their members, no coordinated effort by the three had occurred, either in development of clinical guidelines and standards, or in discussing related issues and differences.

After preliminary planning, a first meeting involving top administration from each group was held in Ft. Lauderdale in 1997. Out of that meeting grew a plan to identify and develop clinical practice statements that met the 1990 Institute of Medicine definition that ...” Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.” The proposed joint enterprise sought to achieve professional consensus. It recognized longstanding efforts to define clinical practice patterns and guidelines by ASHA, additional relevant positions and products of AAA, and the goal of the VA to establish clinical guidelines including step-by-step decision trees called clinical algorithms.

After agreeing on the need for such an effort, a Joint Audiology Committee on Clinical Practice was established. It had members that included and/or were chosen by the top administration of the three organizations. Four face-to-face meetings and several telephone conferences were held in 1997-1999. The focus of all of the meetings was to achieve consensus and to identify areas in which common policy for the entire profession would benefit recipients of care, to develop practice documents that reflected common ground among the participants, and to make decisions that incorporated the best of research, clinical study, and national peer review in the areas of choice.

The members of the Joint Audiology Committee on Clinical Practice Algorithms and Statements (and their responsibilities when appointed) included:

Gene Bratt, PhD; Chief, Audiology and Speech Pathology, Nashville VA; Medical Center; Past-Chair, VA National Field Advisory; Council in Audiology and Speech Pathology.

Kathleen Campbell, PhD; Associate Professor of Audiology, Southern Illinois University; Chair, National Task Force on Professional Practice Standards, American Academy of Audiology.

Evelyn Cherow, MA; Director, Audiology Division, American Speech- Language-Hearing Association.

Alison Grimes, MA; Director, Providence Speech and Hearing Center (CA); Member, Board of Directors, American Academy of Audiology.

George Haskell, PhD; Chief, Audiology and Speech Pathology, Iowa City VA; Medical Center; Member, VA National Field Advisory Council in Audiology and Speech Pathology.

Lawrence Higdon, MA; Director, Audiolabs (TX); Vice President for Professional Practices in Audiology, American Speech- Language-Hearing Association.

Patricia McCarthy, PhD, Director of Audiology, Rush-Presbyterian-St. Luke's Medical Center, Chicago; Past-President and Member, Board of Directors, American Academy of Audiology.

Douglas Noffsinger, PhD, Professional Department Chair, Audiology and Speech Pathology, VA Greater Los Angeles Healthcare System; Chair, VA National Field Advisory Council in Audiology and Speech Pathology.

Several professionals served in ex-officio or consultant capacities to the committee during its deliberations, including:

Lucille Beck, PhD; National Director, VA Program in Audiology and Speech Pathology;

Deborah Hayes, PhD; President, American Academy of Audiology;

Gay Ratcliffe, PhD; Vice President for Administration and Planning, American Speech-Language-Hearing Association;

Kyle Dennis, PhD; Chief, Audiology and Speech Pathology, VA Greater Chicago Healthcare System; and

Charles Martinez, MA; Associate Chief, Audiology and Speech Pathology, VA West Los Angeles Healthcare Center.

Goals and Philosophy

The overall goal of the audiology projects was to maximize the value of health care delivered to patients and clients. National consensus was sought on ideal practices, on maximizing quality through achieving desired outcomes, on customer satisfaction, and on efficient and appropriate use of procedures and resources. The target measures—audiologic assessment, hearing aid selection and fitting, and cochlear implant procedures—were procedures that were done frequently, were expensive, and/or carried some risk. The effort assumed that clinical practice statements and algorithms are useful to the degree that: 1) they reflect the best of basic and clinical research and experience; 2) they offer both guidance and opportunities for education in clinical decision making; and 3) they reduce variation in care where appropriate, thereby optimizing resource utilization.

Overview of Audiology Services: Statement 1 and Algorithm 1 of the Joint Audiology Committee

A Joint Audiology Committee consisting of representatives of the American Academy of Audiology (AAA), the American Speech-Language-Hearing Association (ASHA) and the Department of Veterans Affairs (VA) was formed to develop a set of Practice Statements and accompanying Algorithms for the profession of Audiology in order to provide a concise framework for the provision of quality audiologic services. These practice statements and accompanying algorithms are not intended to replace policy documents of the respective organizations that comprise the Joint Committee on Audiology. These Statements and Algorithms represent the collaboration and cooperation of the three named audiology constituencies.

The purpose of clinical practice statements and their associated decision trees (algorithms) is to recommend doing or not doing procedures to solve a clinical problem. Audiologists use them to outline the types of procedures they may conduct and interpret based on a patient's presenting concern and history. Although they are not intended to prescribe a particular protocol, they are representative of current preferred audiology practice and can serve as useful reference for other professionals, accrediting bodies, administrators, and third-party payors.

In these documents, Practice Algorithms provide diagrammed guidelines using a step-by-step decision tree. Practice Statements accompanying each algorithm serve as support documents that provide further explanation of the clinical process. To date, five Audiologic Practice Statements and Algorithms have been developed: Overview of Audiologic Services; Comprehensive Audiologic Assessment

(adult); Comprehensive Audiologic Assessment (pediatric); Hearing Aid Selection and Fitting; and Cochlear Implant Assessment, Programming, and Audiologic Rehabilitation (adult). Although pediatric audiologic assessment is not currently a major concern of the VA, it may become so.

The Overview of Audiologic Services Algorithm provides a visual representation of Audiology services delivery as a whole. The other four algorithms and statements present the implementation of this overview. Each statement and algorithm reflects practice that is based on current research and clinical literature. Further, each algorithm and statement is supported by a bibliography that includes position statements, guidelines, tutorials, related documents, and reports developed by the Department of Veterans Affairs, the ASHA, as well as AAA. How these are used and coded is explained shortly.

Several professional constants common to all Practice Statements and Algorithms follow. (See Core Documents A, B, D-G in Table 1.)

Personnel: Audiologists are autonomous professionals who diagnose and treat individuals with auditory, balance and related disorders. Audiologists have Masters and/or Doctoral degrees in audiology from regionally-accredited universities. Most states have audiology licensure, certification, or registration. National professional organizations have Codes of Ethics and specific credentials: the American Speech-Language-Hearing Association requires the Certificate of Clinical Competence-Audiology (CCC-A) and the American Academy of Audiology recommends Board Certification in Audiology, American Board of Audiology.

Referrals: Audiologists receive referral for services from a variety of sources, e.g., educators, healthcare professionals, government and private agencies, consumer organizations, as well as self-referral. Audiologists refer out to other professionals. Referral also may be made using Common Procedural Terminology (CPT) codes and/or affiliated nomenclature.

Population: Audiologists serve individuals of all ages.

Equipment and Test Environment: Testing is conducted as appropriate in an environment where ambient noise levels meet current American National Standards Institute (ANSI) standards. Electroacoustic equipment meets manufacturer's and the current ANSI standards for such equipment.

Safety and Health Precautions: All procedures ensure the safety of the patient and audiologist as well as adhere to Standard Health Precautions (e.g., prevention of bodily injury and transmission of infectious disease).

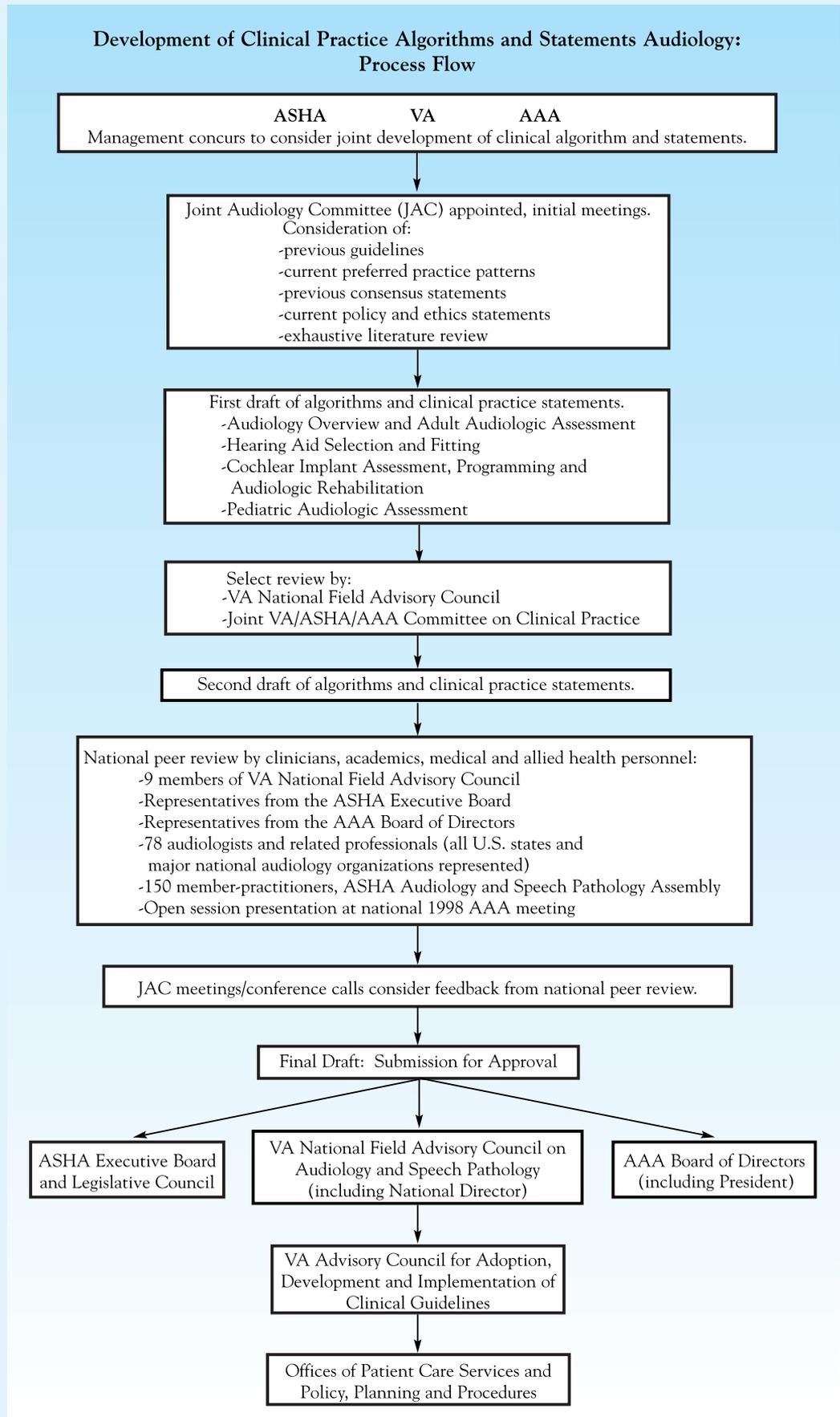
(Literature references to common elements of the algorithms/statements are included in each set of documents. The Joint Committee Overview of Audiology is Algorithm 1.)

Development, Peer-Review, and Administrative-Review Plan

The Joint Audiology Committee created a plan to develop the clinical practice statements and algorithms. The plan included national peer review and clinical-expert and administrative review at appropriate points. The plan was premised on the need for documents that represented a true consensus of the profession. A schematic of that process is graphed on this page.

In summary, the algorithms and supporting practice documents have now been reviewed by top administration and peer reviewed by clinical leaders and practitioners of all three constituent organizations nationally. This includes review by the eleven members of the ASHA Executive Board, the twelve members of the AAA Board of Directors, and the nine members of the VA National Field Advisory Council in Audiology and Speech Pathology. In addition, reviews were sought from the 150 members (practicing professionals) of the ASHA Legislative Council and from 78 audiologists and related professionals chosen by the Joint Committee nationally as part of a peer-review process. These reviews sought opinion from allied health professionals and practicing audiologists/ speech pathologists in every state in the country. In addition, the activities and draft documents of the Joint Audiology Committee were presented in open session at the national meeting of the American Academy of Audiology in Los Angeles in 1998, and transcripts of that session were kept.

The reviews from all sources were considered on an item-by-item basis by the Joint Audiology Committee, and the documents contained in this submission include those modifications. The final stage in this long-term effort is to seek final approval of the practice



algorithms and statements from the organizations, namely, from the Executive Board including the President of ASHA, from representatives of the Undersecretary for Health for the VA (through the Director of Audiology and Speech Pathology and her Field Advisory Council, the VHA Advisory Council for Adoption, Development and Implementation of Clinical Guidelines, and the VHA Offices of Patient Care Services and Policy, Planning, and Performance), and from the Board of Directors including the President of AAA.

Definitions, Evidence, and Strength of Evidence

Each of the remaining four algorithms is accompanied by a practice statement. The practice statement includes definitions of certain critical variables that apply to each algorithmic decision tree. Some categories requiring definition are common to all procedures. These include:

- 1) Personnel;
- 2) Referrals;
- 3) Associated Common Procedural Codes (CPT);
- 4) Population;
- 5) Clinical Indicators;
- 6) Objectives;
- 7) Expected Outcomes;
- 8) Clinical Process;
- 9) Equipment and Test Environment;
- 10) Safety and Health Precautions; and
- 11) References.

The eleven common factors defined for each audiologic procedure are those that the literature, previous guidelines in many fields, and clinical experience suggest are essential in efficient, comprehensive, clinical decision making. The definitions may differ from procedure to procedure, but each factor must be defined for proper and consistent use of the procedure.

1. Core Materials. Certain documents (including previous guidelines to preferred practice patterns, national consensus guidelines, ethical considerations, standards and scopes of practice, and health and safety

TABLE 1. Core Documents for Audiologic Practice Statements and Algorithms		
#	Document	Code
1.	American Speech-Language-Hearing Association. (1997) <i>Preferred Practice Patterns for the Profession of Audiology</i> . Rockville, MD:ASHA.	A
2.	American Academy of Audiology. (1996). <i>Report of the Task Force on Professional Practice Standards</i> . McLean, VA:AAA.	B
3.	Department of Veterans Affairs. (1996). <i>Roles and Definitions For Clinical Practice Guidelines and Clinical Pathways</i> . Veterans Health Administration Directive:96-053.	C
4.	Centers for Disease Control. (1988). <i>Universal Precautions For the Prevention of Transmission of HIV, HBV, and other Blood-borne Pathogens in Health Care Settings</i> . 37:24.	D
5.	U.S. Department of Labor, Occupational Safety and Health Administration. (1991). <i>Occupational Exposure to Blood-Borne Pathogens: Final Rule</i> . Washington D.C.: Federal Register.	E
6.	American Academy of Audiology. (1996). <i>Audiology: Scope Of Practice</i> . McLean VA:AAA.	F
7.	American Speech-Language-Hearing Association. (1996). <i>Scope of Practice in Audiology</i> . <u>ASHA</u> 38:12-15.	G
8.	Veterans Health Administration Audiology and Speech Pathology Services. (1997). <i>Clinical Algorithms and Clinical Pathways</i> . Washington D.C.:Professional Practices Manual.	H
9.	Department of Veterans Affairs and Vanderbilt University. (1991). <i>The Vanderbilt Hearing Aid Report II</i> . Eds. Studebaker G, Bess F, Beck L. Parkton, MD: York Press.	I
10.	Department of Veterans Affairs and Vanderbilt University. (1982). <i>The (Vanderbilt Hearing Aid Report: State-of-the-Art Research Needs</i> . Eds. Studebaker G. and Bess F. Darby, PA: Monographs in Contemporary Audiology.	J
11.	National Institutes of Health. (1995). <i>Cochlear Implants In Adults Children</i> . Washington D.C.:NIH Consensus Statement 13(2):1-30.	K
12.	National Institutes of Health. (1993). <i>Early Identification of Hearing Loss in Infants and Young Children</i> . Washington D.C.:NIH Consensus Conference.	L
13.	Joint Committee of the American Speech-Language-Hearing Association/Council on Education of the Deaf. (1994). <i>Service Provision under the Individuals with Disabilities Education Act— Part H, as Amended, to Children Who are Deaf and Hard of Hearing Ages Birth to 36 Months</i> . <u>ASHA</u> 36:117-121.	M
14.	American Speech-Language-Hearing Association. (1993). <i>Definitions of Communication Disorders and Variations</i> . <u>ASHA</u> : 35:Suppl. 10.	N
15.	American Academy of Audiology. (1991). <i>Code of Ethics</i> . <u>Audiology Today</u> 3(1):14-16.	O
16.	National Institutes of Health/Department of Veterans Affairs. (1999). <i>The NIH/VA Clinical Trial on Hearing Aids</i> . Eds. Larson V., Beck L., Huerta L. et al. <u>New England Journal of Medicine</u> , XXXX.	P

considerations) were regarded as Core Materials and were consulted in preparation of each practice statement and algorithm. Those are tabled here and given an alphabetic code—(A), (B) etc. The codes are used to reference the documents and these references appear throughout the entire set of algorithms.

2. Algorithm-Specific Materials.

In addition to the Core Materials, selected key references are included in a bibliography that ends each clinical practice statement. These literature items were considered by the Joint Committee to contain generic work whose value has been tested by clinical trial, laboratory research, or analysis of outcomes data, or to be consensus guidelines or nationally-developed regulations and procedures. For each practice statement and associated algorithm, these items are given a numeric code—(1), (2) etc. The codes are used to reference the items. The codes refer only to the references in the clinical practice statement associated with the particular algorithm in question.

3. Comments. At certain steps in the algorithms, the JAC thought certain comments were sufficiently important to insert them in the algorithm. These comments are labeled (e.g.): **Attention: Comment [1]**. The step in the algorithm to which the comment is related is similarly labeled (e.g.): [1].

4. Strength of Evidence and Recommendation. Although each audiology algorithm is supported by a clinical practice document with a reference list of work that contributed to the steps in the algorithm, and by core documents that contain consensus statements, research and clinical-trial based preferred practices in audiology in 1999, the Joint Committee also

TABLE 2. Strength of Evidence/Recommendation for the Audiology Algorithms	
Grade I:	Evidence is strong and usually obtained from randomized controlled trials or well-designed clinical studies. The recommendation is usually indicated and accepted, and is considered effective and useful.
Grade II:	Evidence is from clinical studies that were based on retrospective data analysis, clinical trials that were not randomized and/or carefully-controlled, or from panel consensus based on existing guidelines and practice patterns. The recommendation is accepted and the weight of evidence supports its use and effectiveness.
Grade III:	Evidence is secondary in that it is based on current or long-standing practice without substantial supporting basic or clinical data. The recommendation is acceptable, but its necessity or usefulness may be questioned. The recommendation is made because it may be useful, and is not harmful.

made decisions about the supporting evidence and strength of its recommendation based on all of the materials and existing guidelines reviewed.

The strength of evidence assessment used a modified form of the process recommended by the Agency for Health Care Policy and Research and by the Veterans Health Administration's Advisory Council for Adoption, Development, and Implementation of Clinical Guidelines.

5. Using the Audiology Practice Statements and Algorithms. To illustrate, if an "action box" in an algorithm contains instructions such as "Perform Selection

Measures" and the notation "(A)(1-3)(I)", this code instructs the user that document 'A' in the Core Materials and references '1-3' in the practice statement associated with this particular algorithm contain evidence and/or information of value about the instructions/action. It also informs the user that the Joint Committee's review of the Core Materials tabled earlier, and the references cited in the associated practice statement for this algorithm, resulted in a "strength of evidence and recommendation" of (I), i.e., the evidence was strong and the recommendation is accepted, useful, and effective.

CLINICAL PRACTICE ALGORITHMS AND STATEMENTS

The algorithms and statements follow, and are organized in this fashion:

Algorithm 1. Joint Audiology Committee Algorithm on Overview of Audiologic Services. (See Statement 1, JAC overview, in previous text at page 34).

Algorithm 2. Joint Audiology Committee Algorithm on Comprehensive Audiologic Assessment (developmental age 5 years through adult). JAC Statement 2 on Comprehensive Audiologic Assessment (developmental age 5 years through adult) follows the algorithm.

Algorithm 3. Joint Audiology Committee Algorithm on Hearing Aid Selection and Fitting (adult). JAC Statement

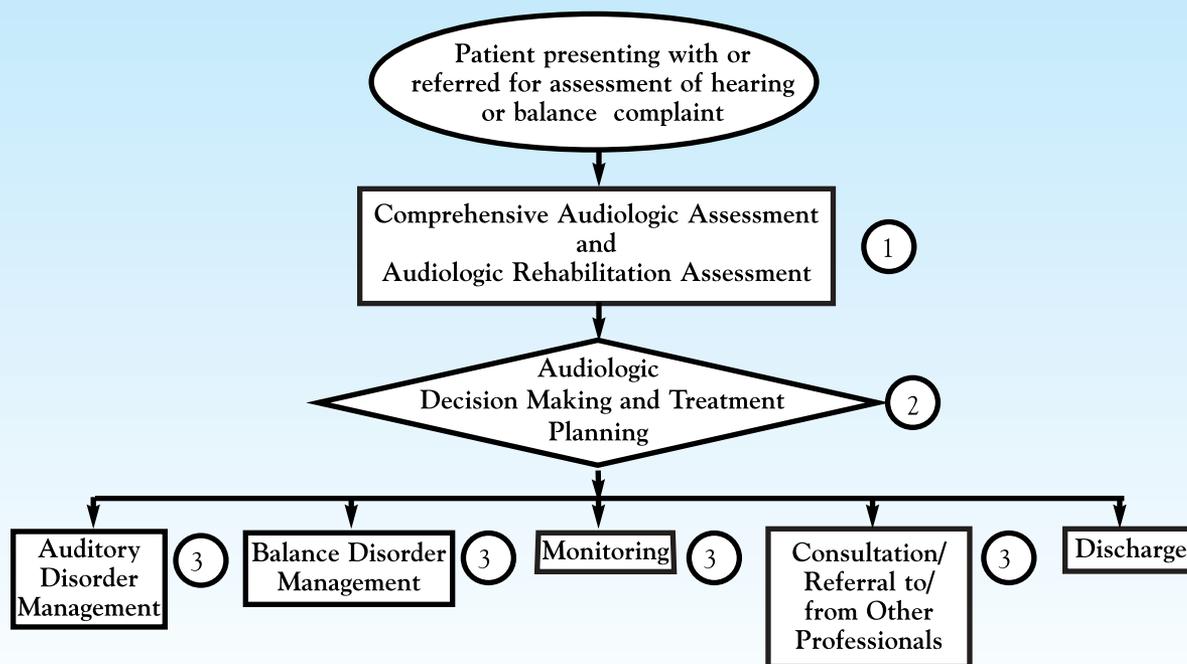
3 on Hearing Aid Selection and Fitting (adult) follows the algorithm.

Algorithm 4. Joint Audiology Committee Algorithm on Cochlear Implant Assessment, Programming, and Audiologic Rehabilitation (adult). JAC Statement 4 on Cochlear Implant Assessment, Programming, and Audiologic Rehabilitation (adult) follows the algorithm.

Algorithm 5. Joint Audiology Committee Algorithm on Pediatric Comprehensive Audiologic Assessment (developmental age neonate - 5 years). JAC Statement 5 on Pediatric Comprehensive Audiologic Assessment (developmental age neonate - 5 years) follows the algorithm.

ALGORITHM 1. Joint Audiology Committee Overview of Audiology Services: Diagnosis and Management of Auditory and Balance Disorders

Algorithm: Overview of Audiology Services



Statement 2.
Joint Audiology Committee
Statement on Comprehensive
Audiologic Assessment
(developmental age 5 years
through adult)

This statement and accompanying algorithm describe the audiologic care provided to patients who receive audiologic assessment. The components of patient care described are not intended to be all-inclusive. Professional judgment and individual patient characteristics may substantially affect the nature, extent, and sequence of services provided. All services are provided in compliance with State and Federal legislation and regulations.

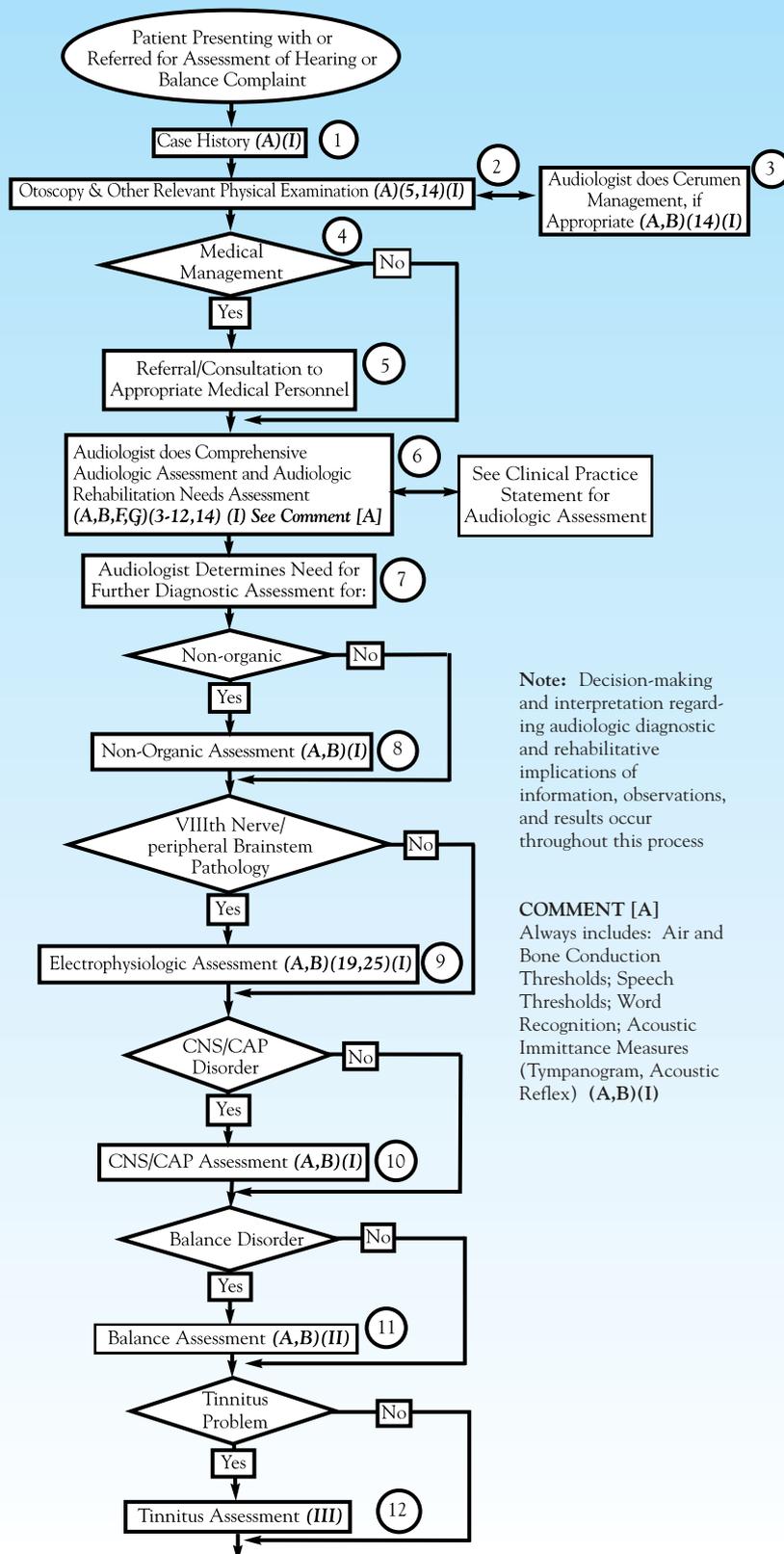
Personnel: Audiologists are autonomous professionals who diagnose and treat individuals with auditory, balance, and related disorders. Audiologists have Masters and/or Doctoral degrees in Audiology from regionally accredited universities. Most states have audiology licensure, certification, or registration. National professional organizations have codes of ethics and specific credentials for clinical practice; the American Speech-Language-Hearing Association requires the Certificate of Clinical Competence-Audiology (CCC-A) and the American Academy of Audiology recommends Board Certification in Audiology, American Board of Audiology.

Referrals: Audiologists receive referral for services from a variety of sources, e.g., educators, healthcare professionals, government and private agencies, consumer organizations, as well as self-referral. The typical terminology used in referrals for audiologic assessments includes “hearing test/examination/exam”, “audiogram and/or tympanogram”, “hearing evaluation”, and “comprehensive audiometry threshold evaluation”. Referral also may be made using common procedural terminology (CPT) codes and/or affiliated nomenclature. Audiologists refer out to other professionals.

Associated CPT Codes: Depending on the services required for the patient, the following Common Procedural Terminology (CPT) codes may be appropriate:

ALGORITHM 2.
Joint Audiology Committee Algorithm on Comprehensive
Audiologic Assessment
 (developmental age 5 years through adult)

Algorithm: Comprehensive Audiologic Assessment



Note: Decision-making and interpretation regarding audiologic diagnostic and rehabilitative implications of information, observations, and results occur throughout this process

COMMENT [A]
 Always includes: Air and Bone Conduction Thresholds; Speech Thresholds; Word Recognition; Acoustic Immittance Measures (Tympanogram, Acoustic Reflex) (A,B)(I)

- 92552(Pure tone audiometry, air only)
- 92553(Pure tone audiometry, AC/BC)
- 92555(Speech threshold testing)
- 92556(Speech/word recognition testing)
- 92587(Otoacoustic emissions, limited)
- 92557(Comprehensive audiometry)
- 92588(Otoacoustic emissions, diag.)
- 92565(Stenger, pure tone)
- 92567(Acoustic immittance)
- 92568(Acoustic reflex thresholds)
- 92569(Acoustic reflex decay testing)
- 92577(Stenger, speech)
- 69210(Cerumen management)

Other clinical and/or educational management codes may apply.

Population: Individuals with a developmental age five years and older; adolescents; and adults. See separate statements/algorithms for individuals with developmental ages under five years.

Clinical Indicators: Any individual who is at risk of auditory disorder or for whom auditory disorder is known or suspected.

Objectives:

- To determine if an auditory disorder is present;
- To identify type of auditory disorder;
- To quantify degree and configuration of hearing loss and the associated disability;
- To describe characteristics of auditory function, including speech recognition and loudness tolerance;
- To assess functional communication needs;
- To determine the need for additional management.

Expected Outcomes:

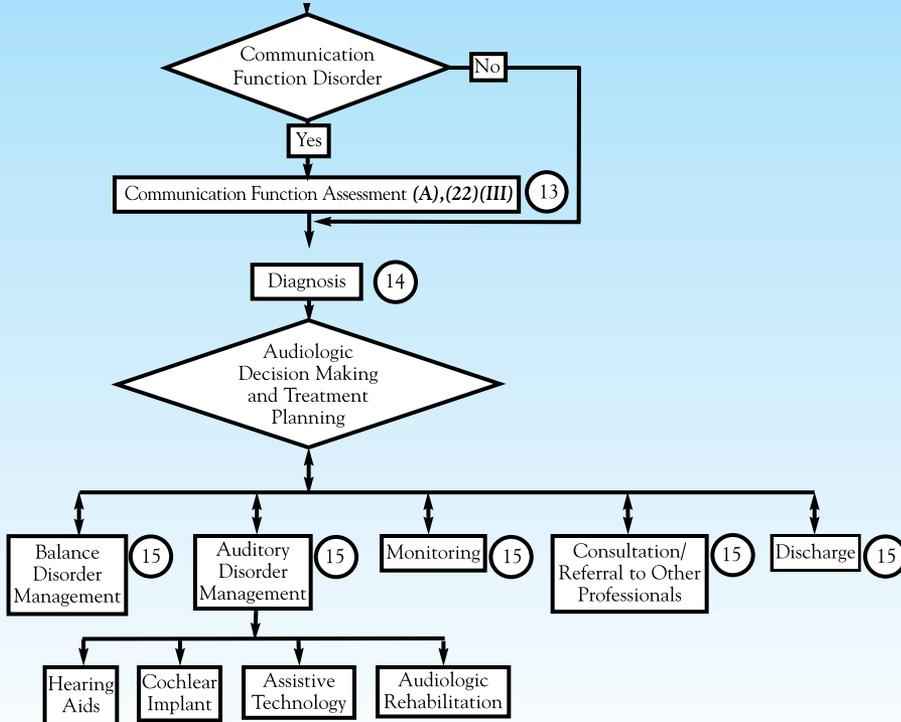
- Development of a culturally-appropriate audiologic rehabilitative management plan, including referral plans if needed.
- Preparation of a report summarizing findings, interpretation, recommendations, and audiologic management plan.
- Provision of patient counselling and education to include type and degree of hearing loss, associated disability, and management and rehabilitative options.

Audiologic Clinical Process: The assessment process may vary from that specified in

ALGORITHM 2.
Joint Audiology Committee Algorithm on Comprehensive Audiologic Assessment
 (developmental age 5 years through adult)

Algorithm: Comprehensive Audiologic Assessment

continued from previous page



this statement based on patient need and the assessment setting. Decision-making and interpretation regarding diagnostic and rehabilitative implications of information, observations, and results occur throughout this process.

The components of the assessment may include:

- History
- Appropriate physical examination (e.g., otoscopy)
- Cerumen management
- Air conduction pure-tone thresholds with appropriate masking
- Bone conduction pure-tone thresholds with appropriate masking
- Speech thresholds with appropriate masking
- Speech recognition measures with appropriate masking
- Acoustic immittance (tympanometry/acoustic reflex thresholds)
- Acoustic reflex decay
- Rehabilitative needs assessment
- Communication inventory
- Otoacoustic emissions
- High-frequency audiometry
- Speech Stenger
- Pure-tone Stenger

Also included in the assessment is determination of need for further diagnostic procedures to investigate:

- Non-organicity
- VIIIth nerve/peripheral brainstem pathology
- CNS/CAP disorders
- Balance disorders
- Tinnitus problem
- Status of communication function

Components of management include but are not limited to:

- Interpretation and documentation of assessment process results
- Development of recommendations for audiologic follow-up, for referral and coordination with other services, and for education, guidance and counselling as needed.
- Provision of counselling and education to patient, family, and/or caregiver, including prevention and hearing conservation strategies

Equipment and Test Environment: Testing is conducted as appropriate in an environment where ambient noise levels meet current American National Standards Institute (ANSI) standards. Electroacoustic equipment meets manufacturer's and the current ANSI standards for such equipment.

Safety and Health Precautions: All procedures ensure the safety of the patient and audiologist, as well as adhere to Standard Health Precautions (e.g., prevention of bodily injury and transmission of infectious disease).

References:

1. American Academy of Audiology. (1991). Code of ethics. *Audiology Today*, 3(1), 14-16.
2. American Academy of Audiology. (1996). *Audiology: Scope of practice*. McLean (VA):AAA Publ.
3. American National Standards Institute. (1981). Reference equivalent threshold for audiometric bone vibrators [ANSI S3.1-1977 (R1981)]. New York:Acoustical Society of America.
4. American National Standards Institute. (1986). Artificial head bone for the calibration of audiometer bone vibrators [ANSI S2.1972 (R1986)]. New York: Acoustical Society of America.
5. American National Standards Institute. (1987). Specifications for instruments to measure aural acoustic impedance and admittance (aural acoustic immittance) (ANSI S3-.39-1987). New York:Acoustical Society of America.
6. American National Standards Institute. (1991). Maximum permissible ambient noise levels for audiometric test rooms (ANSI S3.1-1991). New York: Acoustical Society of America.
7. American National Standards Institute. (1992). Method of manual pure-tone threshold audiometry [ANSI S3.21 1978 (R1992)].
8. American National Standards Institute. (1996). Specifications for audiometers (ANSI S3.1996). New York: Acoustical Society of America.
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Manual pure-tone threshold audiometry. *ASHA*, 20(4), 297-301.

10. American Speech-Language-Hearing Association. (1987). Calibration of speech signals delivered via earphones. *ASHA*, 29(6), 44-48.
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12. American Speech-Language-Hearing Association. (1990). Guidelines for audiometric symbols. *ASHA*, 32 (Suppl. 2), 25-30.
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17. American Speech-Language-Hearing Association. (1997). Guidelines for audiology service delivery in nursing homes. *ASHA*, 39(Suppl. 17), 15-29.
18. American Speech-Language-Hearing Association. (1997). Preferred practice patterns for the profession of audiology. Rockville, MD: ASHA.
19. American Speech-Language-Hearing Association. (1999). Competencies in auditory evoked potential measurement and clinical applications: guidelines. *ASHA*, 41(Suppl.19), 23-28.
20. Bratt G, Freeman B, Hall J, Windmill I. (1996). The audiologist as an entry point to healthcare: models and perspectives. *Seminars in Hearing*,17(3), 227-234.
21. Centers for Disease Control. (1988). Universal precautions for the prevention of transmission of HIV, HBV, and other blood-borne pathogens in health care settings, 37, 24.
22. Committee on Rehabilitative Audiology. (1983; currently in revision). Definitions and competencies for aural rehabilitation. *ASHA Desk Reference IV*, 101-107.
23. Department of Veterans Affairs. (1996). Roles and definitions for clinical practice guidelines and clinical pathways. Veterans Health Administration Directive 96-053.
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26. Larsen, E. (1988). Guideline for use of topical antimicrobial agents. *American Journal of Infection Control*, 16, 253-266.
27. U.S. Department of Labor. (1991). Occupational exposure to blood-borne pathogens: Final rule. Occupational Safety and Health Administration: 29 CFR 1910.1030. Washington, D.C.: Federal Register.
28. Veterans Health Administration Audiology and Speech Pathology Services. (1997). Clinical algorithms and clinical pathways. Professional Practices Manual. Washington D.C.: DVA.

Statement 3. Joint Audiology Committee Statement on Hearing Aid Selection and Fitting (adult)

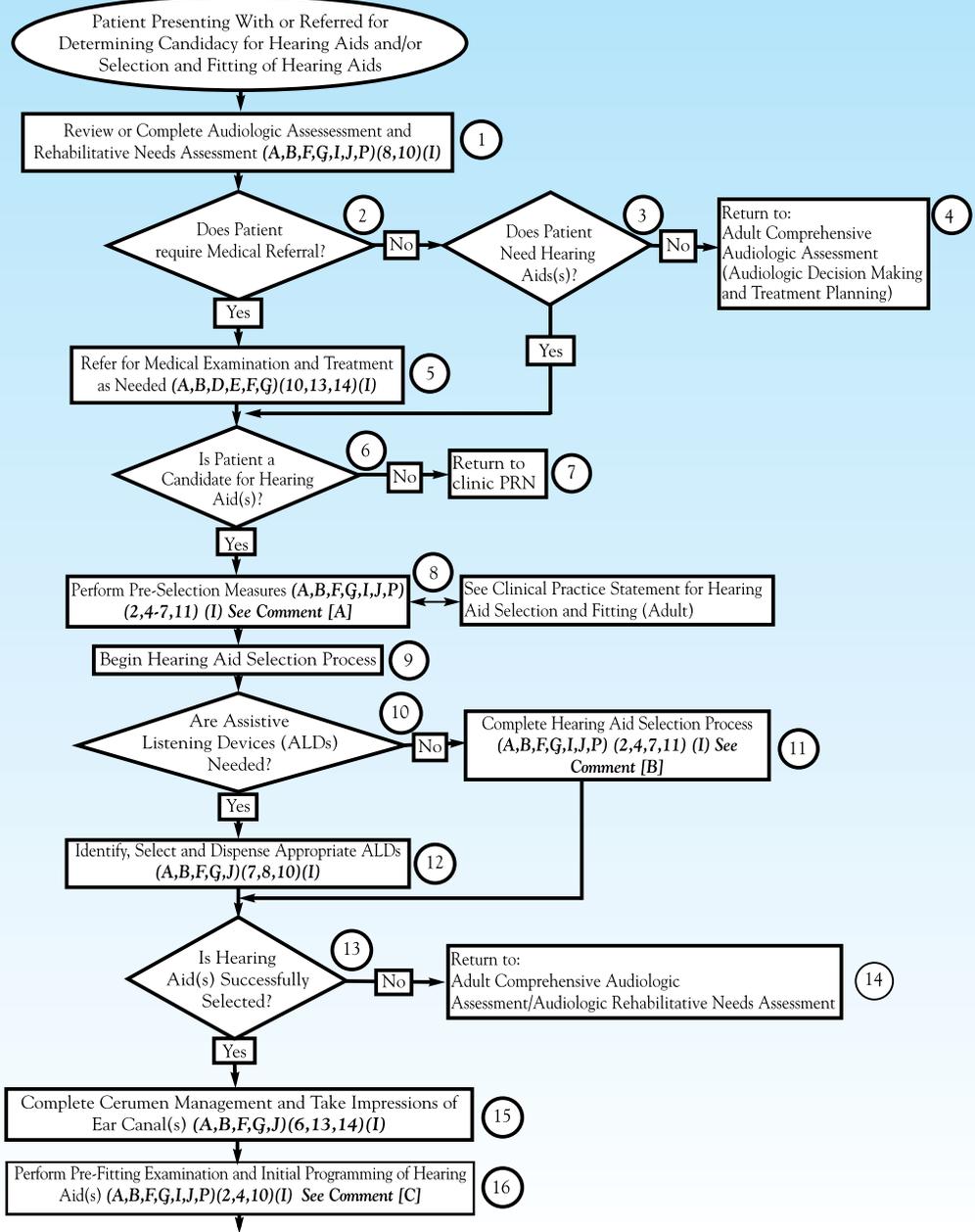
This statement and accompanying algorithm describe the audiologic care provided to hearing aid candidates. The components of patient care described are not intended to be all-inclusive. Professional judgment and individual patient characteristics may substantially affect the nature, extent, and sequence of services provided. Decision making and interpretation regarding diagnostic and rehabilitative implications of information, observations and results occur throughout this process. All services are provided in compliance with state and federal legislation and regulations.

Personnel: Audiologists are autonomous professionals who diagnose and treat individuals with auditory, balance, and related disorders. Audiologists have Masters and/or Doctoral degrees in Audiology from regionally accredited universities. Most states have audiology licensure, certification, or registration. National professional organizations have codes of ethics and specific credentials for clinical practice; the American Speech-Language-Hearing Association requires the Certificate of Clinical Competence-Audiology (CCC-A) and the American Academy of Audiology recommends Board Certification in Audiology, American Board of Audiology.

Referrals: Audiologists receive referral for services from a variety of sources, e.g., educators, healthcare professionals, government and private agencies, consumer organizations, as well as self-referral. Referral also may be made using common procedural terminology (CPT) codes and/or affiliated nomenclature. Audiologists refer out to other professionals.

ALGORITHM 3. Joint Audiology Committee Algorithm on Hearing Aid Selection and Fitting (Adult)

Algorithm: Hearing Aid Selection and Fitting



Note: Decision-making and interpretation regarding diagnostic and rehabilitative implications of information, observations, and results occur throughout this process.

ATTENTION: Comment [A]

Options Include: Loudness Measures; Real Ear Measures; Unaided Communication Inventory; Physical, Psychologic, Sociologic and Communication Status; Physical Examination of Ear; Explanation of Expectations from Amplification; Other Measures as Appropriate (Unaided Speech, etc.)

ATTENTION: Comment [B]

Options Include: Type(s) of Device(s); Ear(s) to be Fitted; Circuitry Considerations; Electroacoustic Objectives; Non-electroacoustic Characteristics; Special Features; Patient Communication Needs

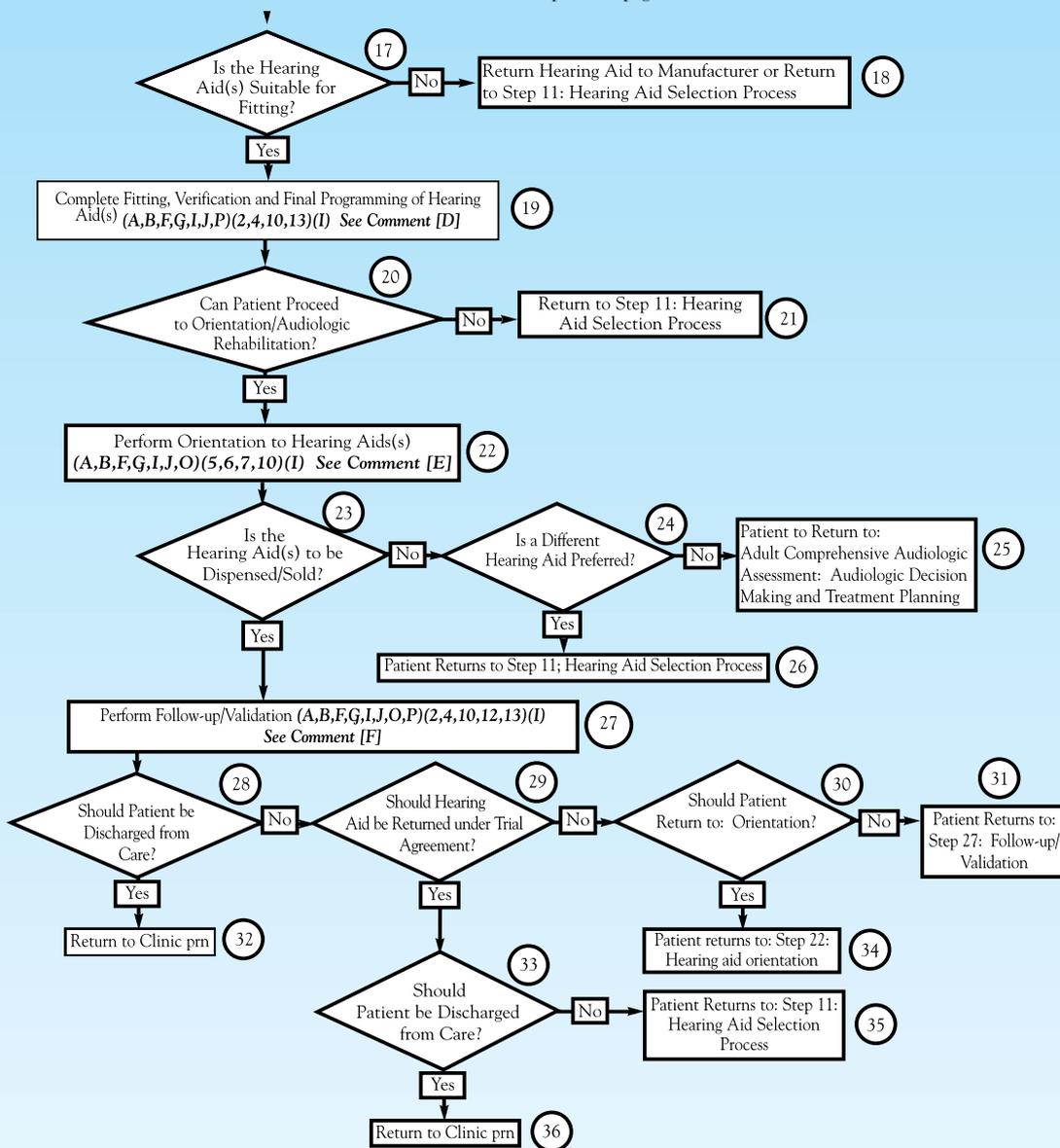
ATTENTION: Comment [C]

Options Include: Physical Examination of Features; Verification of Coupler Measurements for Quality Control; Pre-programming of Circuitry Parameters

ALGORITHM 3. Joint Audiology Committee Algorithm on Hearing Aid Selection and Fitting (Adult)

Algorithm: Hearing Aid Selection and Fitting

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ATTENTION: Comment [D]

Options Include: Cerumen Management; Examine Physical Fit of Aid(s); Real Ear Verification of Circuitry; Parameters for Quality Control; Programming of Circuitry; Examination of Special Features; Other Measurements as Appropriate (aided speech measures, etc); Preliminary Orientation with Patient/Support Providers; Other Measures as Needed

ATTENTION: Comment (E)

Options Include: Consider Cognitive Status of Patient; Consider Patient Support Systems; Consider Physical Status of Patient; Discuss Communication Strategies; Demonstrate Use of Aid(s); Demonstrate Care of Aid(s)

ATTENTION: Comment [F]

Options include: Relevant Physical Examination of Ear; Cerumen Management; Real Ear Measurement of Circuitry Parameters; Re-Program if Necessary; Complete Aided Communication Inventory; Complete Benefit Inventory; Complete Satisfaction Inventory; Speech Perception Measures and Estimate of Aided Audition

Associated CPT Codes:

Depending on the services required for the patient, the following Common Procedural Terminology (CPT) codes may be appropriate:

- 69210 (Cerumen management)
- 92590 (Hearing aid exam, 1 ear)
- 92591 (Hearing aid exam, 2 ears)
- 92599 (Unlisted ENT procedure ear impression)
- 99002 (Product dispensing/handling)
- 92506 (Cochlear implant eval.)
- 92507 (Aural rehabilitation treatment)
- 92594 (Electro. hearing aid test, 1 ear)
- 92508 (Speech/hearing therapy, group)
- 92595 (Electro. hearing aid test, 2 ears)

Other clinical and/or educational management codes may apply.

Population: Adults 18 years and older.

Clinical Indicators: Any individual who subjectively reports and audiometrically demonstrates hearing loss of a degree that interferes with communication.

Objectives:

- To complete needs assessment regarding amplification, and complete audiologic procedures necessary to initiate treatment plan.
- To select and fit the personal amplification system most appropriate for the communication needs of the patient.
- To verify the appropriateness of the acoustic output of the personal amplification system in a 2-cc coupler, and in the ear of the patient.
- To determine communication function pre- and post-hearing aid selection and fitting to verify benefit and/or satisfaction.

faction to patient, family, and/or caregiver.

- To counsel the patient, family, and/or caregiver on the use and care of hearing aids, and to foster realistic expectations of performance with hearing aids.

Expected Outcomes:

- Provision of patient education to include an explanation of the potential benefits and limitations associated with personal amplification.
- Fitting of a personal amplification system, and verification of its appropriateness for the communication needs of the patient, family, and/or caregiver.
- Verification of compliance of the selected amplification devices to pre-set standards including but not limited to ANSI S3.42-1992 and ANSI S3.22-1996.
- Validation of the benefit to and the satisfaction of the patient, family, and/or caregiver regarding the use of the personal amplification system.
- Demonstration of a support system (e.g., family, agencies, organizations, etc.) to the patient that will maximize the use and maintenance of the personal amplification system.

Audiologic Clinical Process: The procedures of the hearing aid selection and fitting process listed below require the completion of an audiologic assessment within the prior six months. The components described are not designed to be all-inclusive. The clinical decision making process is based on professional judgment and individual patient characteristics that may significantly influence the nature and course of the selection and fitting process. The process may also vary from this guideline based on patient needs, cooperation, comprehension, and the process setting.

The components of the selection and fitting process may include:

- Recent history of auditory function
- Appropriate physical examination (e.g., otoscopy)
- Cerumen management
- Suprathreshold loudness measurements
- Ear impressions
- Hearing aid selection procedure
- Hearing aid performance verification in 2-cc coupler and in the real ear for quality control
- Individual and/or group orientation to amplification
- Unaided/aided communication inventory
- Individual and/or group hearing aid follow-up
- Qualitative assessment of amplification
- Measurement of satisfaction and benefit
- Unaided and aided speech recognition measures

Components of management include but are not limited to:

- Interpretation and documentation of hearing aid selection and fitting process results

- Development of recommendations for audiologic rehabilitative follow-up and referral for and coordination with other services as appropriate
- Provision of counseling and education to patient, family, and/or caregiver

Equipment and Test Environment: Testing is conducted as appropriate in an environment where ambient noise levels meet when necessary American National Standards Institute (ANSI) standards. Electroacoustic equipment meets manufacturer's and the current ANSI standards for such equipment. Specialized equipment specific to each amplification system is available on-site for the evaluation and diagnostic checks for each device employed.

Safety and Health Precautions: All procedures ensure the safety of the patient and audiologist and adhere to Standard Health Precautions (e.g., prevention of bodily injury and transmission of infectious disease).

References:

1. American National Standards Institute. (1991). Maximum permissible ambient noise levels for audiometric test rooms (ANSI S3.1-1991). New York: Acoustical Society of America.
2. American National Standards Institute. (1992). Testing hearing aids with a broad-band noise signal (ANSI S3.42-1992). New York: Acoustical Society of America.
3. American National Standards Institute. (1996). Specifications for audiometers (ANSI S3.6-1996). New York: Acoustical Society of America.
4. American National Standards Institute. (1996). Specifications for hearing aid characteristics (ANSI S3.22-1996). New York: Acoustical Society of America.
5. American Speech-Language-Hearing Association. (1984). Competencies for aural rehabilitation. *ASHA*, 26(5), 37-41 (under review).
6. American Speech-Language-Hearing Association. (1990). Aural rehabilitation: An annotated bibliography. *ASHA*, 32 (Suppl. 1) (under review).
7. American Speech-Language-Hearing Association. (1990). Guidelines for graduate training in amplification. *ASHA*, 33 (Suppl. 5), 35-36 (under review).
8. American Speech-Language-Hearing Association. (1994). Guidelines for fitting and monitoring FM systems. *ASHA*, 36 (Suppl. 12), 1-9 (under review).
9. American Speech-Language-Hearing Association. (1994). Professional liability and risk management for the audiology and speech-language pathology professions. *ASHA*, 36 (Suppl. 12), 25-38.
10. American Speech-Language-Hearing Association Ad Hoc Committee on Hearing Aid Selection and Fitting. (1998). Guidelines for hearing aid fitting for adults. *American Journal of Audiology*, 7(1), 5-13.
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Statement 4. Joint Audiology Committee Statement on Cochlear Implant Assessment, Programming and Audiologic Rehabilitation (adult)

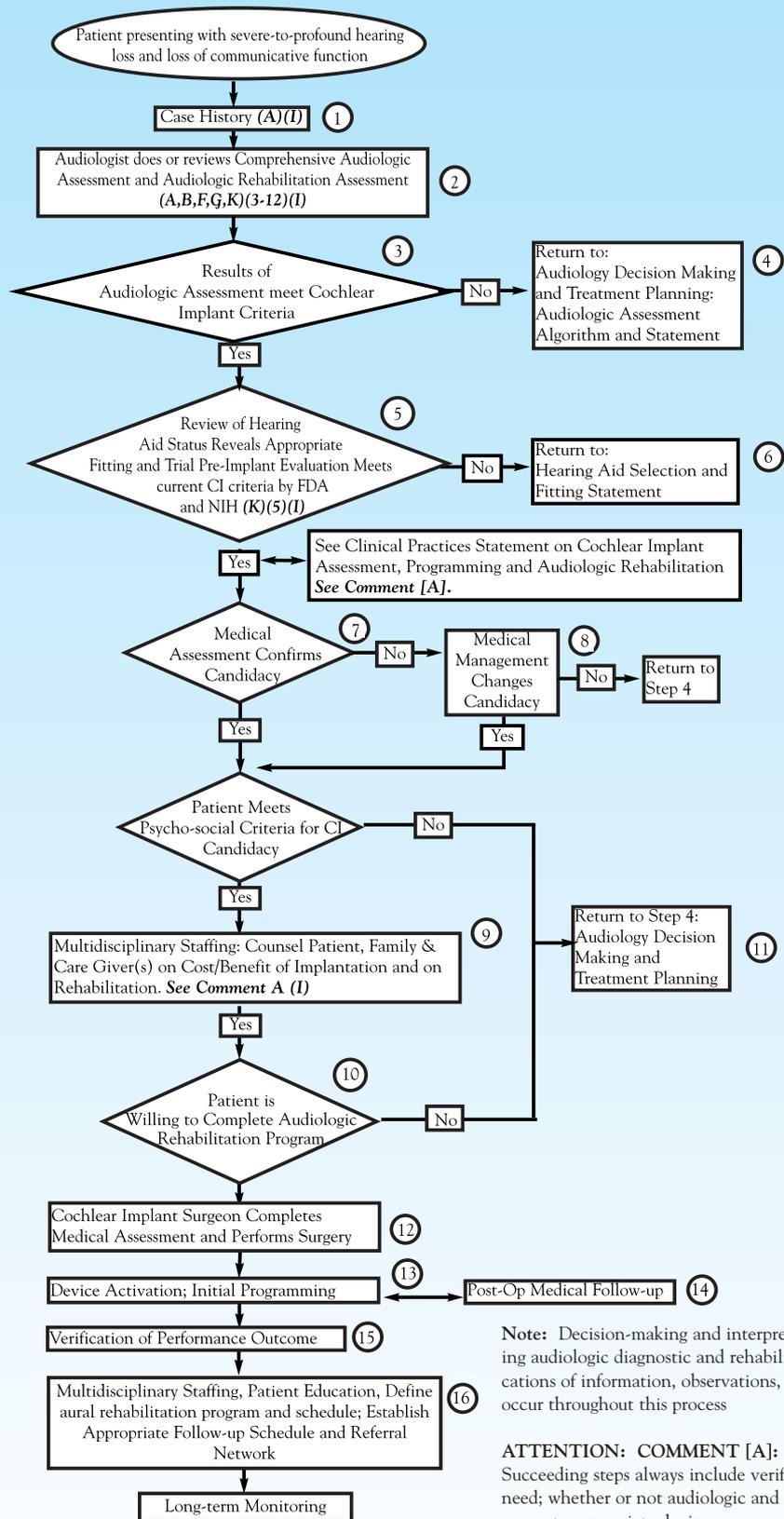
This statement and accompanying algorithm describe the audiology care and audiologic rehabilitation provided to cochlear implant candidates. The components of patient care described are not intended to be all inclusive. Professional judgment and individual patient characteristics may substantially affect the nature, extent, and sequence of services provided. Decision making and interpretation regarding diagnostic and rehabilitative implications of information, observations and results occur throughout this process.

Personnel: Audiologists are autonomous professionals who diagnose and treat individuals with auditory, balance and related disorders. Audiologists have Masters and/or Doctoral degrees in Audiology from regionally-accredited universities. Most states have audiology licensure, certification or registration. National professional organizations have a codes of ethics and specific credentials for clinical practice; the American Speech-Language-Hearing Association requires the Certificate of Clinical Competence-Audiology (CCC-A) and the American Academy of Audiology recommends Board Certification in Audiology, American Board of Audiology.

Referrals: Audiologists receive referral for service from a variety of sources, e.g., educators, healthcare professionals, government and private agencies, consumer organizations, as well as self referral. Audiologists refer out to other professionals. Referral also may be made using common procedural terminology (CPT) codes and/or affiliated nomenclature.

ALGORITHM 4. Joint Audiology Committee Algorithm on Cochlear Implant Assessment (Adults)

Algorithm: Cochlear Implant Assessment (Adults)



Note: Decision-making and interpretation regarding audiology diagnostic and rehabilitative implications of information, observations, and results occur throughout this process

ATTENTION: COMMENT [A]: Succeeding steps always include verification of need; whether or not audiologic and FDA criteria are met; appropriate devices programming; audiologic rehabilitation; and verification of functional status of the implant through subjective and objective assessment.

Associated CPT Codes: Depending on the services required for the patient, the following Common Procedural Terminology (CPT) codes may be appropriate:

- 92506 (Cochlear Implant eval)
- 92507 (Aural Rehabilitation treatment)
- 92557 (Comprehensive audiometry)
- 92556 (Speech/word recognition test)
- 92510 (Cochlear Implant Rehab)
- 92567 (Acoustic immittance)
- 92568 (Acoustic reflex thresholds)
- 92584 (Electrocochleography)
- 92585 (Auditory Evoked Potentials)
- 92587 (Otoacoustic emissions, limited)
- 92588 (Otoacoustic emissions, diag.)
- 92599 (Unlisted ENT Proc./Ear Imp)
- 99002 (Product dispensing/handling)

Other codes may apply.

Population: Adults 18 years and older.

Clinical Indicators: Any individual whose functional communication status, after traditional hearing aid assessment and audiologic rehabilitation, suggests that a cochlear implant may provide greater benefit than traditional acoustic amplification.

Objectives:

- To evaluate auditory status including audiologic procedures necessary to determine the type and degree of hearing loss, and communicative and psychosocial impact.
- To complete needs assessment regarding auditory function sufficient to initiate a treatment plan.
- To determine if patient meets the currently accepted audiologic criteria and FDA requirements for cochlear implantation, including speech recognition testing with conventional amplification after a suitable trial period.
- To optimize auditory function through appropriate programming of the cochlear implant speech processor and provision of audiologic rehabilitation.
- To verify functional status of the cochlear implant through subjective and/or objective assessment of electrically induced auditory function.

Expected Outcomes:

- Provide patient education with respect to the potential benefits and limitations associated with cochlear implants based on the individual's auditory profile.
- Provide recommendations for medical/surgical referral.
- Program the cochlear implant, and verification of its benefit for the communication needs of the patient.
- Verify the satisfaction of the patient, family and/or caregivers regarding the use of the cochlear implant.
- Demonstrate an ongoing support system (professional, financial, environmental, personal and organizational) which will maximize the use and maintenance of the cochlear implant.

Audiologic Clinical Process: The process may vary from this statement based on patient needs. The clinical decision making process is based on professional judgment in recognition of recommendations made by the National Institutes of Health and the Food and Drug Administration concerning

cochlear implants.

Components of the assessment, programming and audiologic rehabilitation process may include:

- Audiologic assessment
- Audiologic electrophysiologic assessment
- Hearing aid assessment with most appropriate amplification
- Pre- and post-implant communication inventories
- Otoacoustic emissions
- Pre- and post-implant patient, family and/or caregiver education
- Cochlear implant assessment protocols specific to each device
- Cochlear implant performance verification with a variety of speech and non-speech stimuli
- Patient, family and/or caregiver orientation to cochlear implant use
- Measurement of satisfaction
- Provision of counseling and education to patient family and/or caregiver Communication inventory with implant operational
- Assessment and fitting of assistive technologies
- Ongoing cochlear implant follow-up and medical management as needed
- Ongoing rehabilitative management of cochlear implant performance/use
- Audiologic rehabilitation
- Referral and coordination with other services as appropriate

Equipment and Test Environment: Testing is conducted as appropriate in an environment where ambient noise levels meet current American National Standards Institute (ANSI) standards. Electroacoustic equipment meets manufacturer's and the current ANSI standards (if any) for such equipment.

Safety and Health Precautions: All procedures ensure the safety of the patient and audiologist, as well as adhere to Standard Health Precautions (e.g., prevention of bodily injury and transmission of infectious disease).

References:

1. American Academy of Audiology. (1991). Code of ethics. *Audiology Today*, 3 (1), 14-16.
2. American Academy of Audiology. (1996). *Audiology: Scope of Practice*. McLean (VA):AAA Publ.
3. American Speech-Language-Hearing Association. (1997). Preferred practice patterns for the profession of Audiology. Rockville, MD: ASHA.
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5. American Speech-Language-Hearing Association. (1992). Electrical stimulation for cochlear implant selection and rehabilitation. *ASHA*, 34 (Suppl. 7), 13-16.
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8. Garner, J. (1996). Guideline for isolation precautions in hospitals. *Infection Control and Hospital Epidemiology*, 53-80
9. Larsen, E. (1988). Guideline for use of topical antimicrobial agents. *American Journal of Infection Control*, 15, 253-266.
10. National Institutes of Health. (1995). Cochlear implants in adults and children. NIH Consensus Statement, 13(2):1-30.

**Statement 5.
Joint Audiology
Committee Statement
on Pediatric
Audiologic Assessment
(developmental age
neonate - 5 years)**

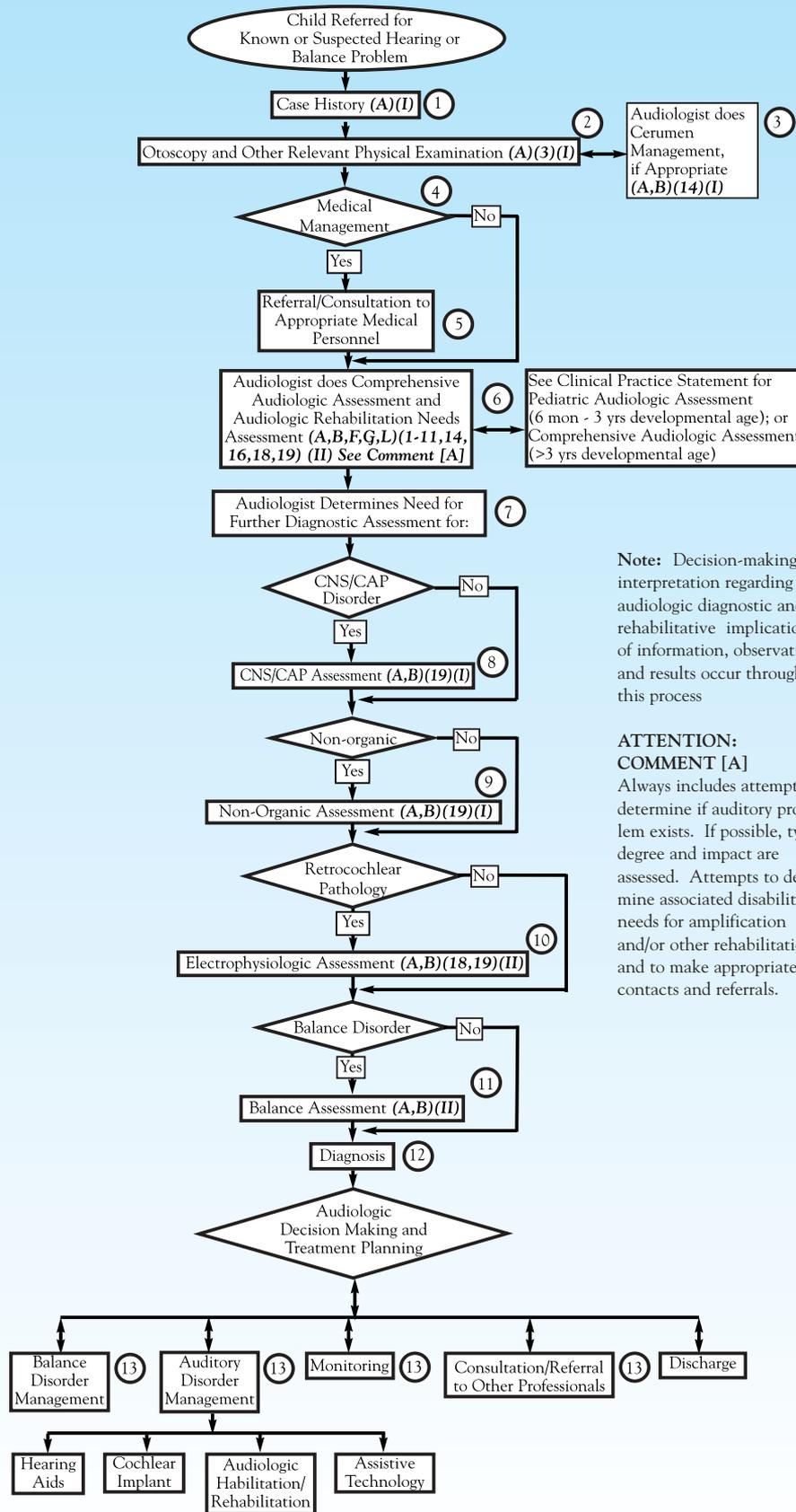
This statement and accompanying algorithm describe the audiologic care provided to pediatric patients who receive audiologic assessment. The components of patient care described are not intended to be all-inclusive. Professional judgment and individual patient characteristics may substantially affect the nature, extent, and sequence of services provided. All services are provided in compliance with state and federal legislation and regulations.

Personnel: Audiologists are autonomous professionals who diagnose and treat individuals with auditory, balance, and related disorders. Audiologists have Masters and/or Doctoral degrees in audiology from regionally-accredited universities. Most states have audiology licensure, certification, or registration. National professional organizations have codes of ethics and specific credentials for clinical practice: the American Speech-Language-Hearing Association requires the Certificate of Clinical Competence-Audiology (CCC-A) and the American Academy of Audiology recommends Board Certification in Audiology, American Board of Audiology.

Referrals: Audiologists receive referral for services from a variety of sources e.g. educators, health care professionals, government and private agencies, consumer organizations, as well as self-referral. The typical terminology used in referrals for pediatric audiologic assessments includes “hearing test/examination/exam”, “audiogram and/or tympanogram”, “hearing evaluation”, and “comprehensive audiometry threshold evaluation”. Referral also may be made using common procedural terminology (CPT) codes and/or affiliated nomenclature.

**ALGORITHM 5.
Joint Audiology Committee Algorithm on Pediatric Audiologic Assessment
(developmental age less than 5 years)**

Algorithm: Pediatric Audiologic Assessment



Note: Decision-making and interpretation regarding audiologic diagnostic and rehabilitative implications of information, observations, and results occur throughout this process

ATTENTION: COMMENT [A]
Always includes attempt to determine if auditory problem exists. If possible, type, degree and impact are assessed. Attempts to determine associated disability, needs for amplification and/or other rehabilitation, and to make appropriate contacts and referrals.

Audiologists refer out to other professionals.

Associated CPT Codes: Depending on the services required for the patient, the following Common Procedural Terminology (CPT) codes may be appropriate:

- 92552 (Pure tone audiometry, air only)
- 92553 (Pure tone audiometry, AC/BC)
- 92555 (Speech threshold recognition testing)
- 92556 (Speech/word recognition testing)
- 92557 (Comprehensive audiometry)
- 92565 (Stenger, pure tone)
- 92567 (Tympanometry)
- 92568 (Acoustic reflex thresholds)
- 92569 (Acoustic reflex decay testing)
- 92596 (Ear protector attenuator measurements)
- 92587 (Otoacoustic emissions, limited)
- 92588 (Otoacoustic emissions, diagnostic)
- 69210 (Cerumen management)
- 92582 (Conditioned Play Audiometry)
- 92579 (Visual Reinforcement Audiometry)
- 92577 (Stenger, speech)
- 92583 (Select Picture Audiometry)
- 92585-22 (Audio/Evoked Potential thresholds)

Other clinical and/or educational management codes may apply.

Population: Infants, young children (under 5 years of age) and other individuals whose developmental levels preclude the use of adult audiologic assessment procedures.

Clinical Indicators: Any individual who is at risk of, suspected of, or identified with auditory impairment, disorder or disability.

Objectives:

- To identify if an auditory impairment disorder or disability is present;
- To identify type of auditory impairment disorder;
- To quantify degree of hearing loss and associated disability;
- To screen for speech-language development;
- To describe characteristics of auditory function, including speech recognition and loudness tolerance;
- To assess functional communication, audiologic rehabilitation, and candidacy for sensory devices (e.g., Hearing aids, assistive devices)
- To determine the need for additional referral and management;
- To notify appropriate state agencies for purposes of child find and appropriate educational management, e.g., Medicaid, Title XIX, Title V, MCH grants, I IDEA Part C coordinating agency. To refer, if appropriate, to state and national support groups.

Expected Outcomes:

- Development of a culturally appropriate audiologic rehabilitative management plan, including referral plans if needed.
- Preparation of a report summarizing findings, interpretation, recommendations, and audiologic management plan.

- Provision of counseling and education to child and family, to include type and degree of hearing loss, implications for language learning and associated disability and management and rehabilitative options.

Audiologic Clinical Process: The pediatric assessment components described are not designed to be all inclusive. The clinical decision making process is based on professional judgment and individual patient characteristics. The assessment process may vary from this guideline based on patient needs, cooperation, and the assessment setting. Decision making and interpretation regarding audiologic diagnostic and rehabilitative implications of information, observations, and results occur throughout this process.

For neonates and infants at birth through 6 months development age, the components of the audiologic assessment may include:

- History
- Appropriate physical examination (e.g., otoscopy)
- Cerumen management
- Otoacoustic emissions
- Electrophysiologic assessment (ABR for the purpose of auditory threshold estimation or for the purpose of assessing neuro-otologic status)
- Audiologic rehabilitation status
- Any behavioral observation assessment is intended for corroboration of parent/caregiver report of the child's auditory behavior rather than for threshold estimation.

The components of the assessment for children at six months developmental age and above may include:

- History
- Appropriate physical examination (e.g., otoscopy)
- Cerumen management
- Use of developmentally-appropriate procedures to obtain air- and bone-conduction pure tone and speech thresholds with appropriate masking for each ear

When it is not possible to obtain the above measures for each ear separately, testing should be completed in a calibrated sound field using frequency-specific stimuli (e.g., warbled pure tones) and speech stimuli. Developmentally appropriate techniques may include: Visual Reinforcement Audiometry (VRA), Conditioned Play Audiometry, Tangible Reinforcement Operant Conditioning Audiometry (TROCA), Visual Reinforcement Operant Conditioning Audiometry (VROCA), Behavioral Observation Audiometry (BOA), etc.

- Acoustic immittance measures including tympanometry and acoustic reflex measures
- Audiologic (re)habilitative and educational needs assessment
- Otoacoustic emissions (OAE)
- Electrophysiologic Assessment (e.g., ABR) for the purpose

of auditory threshold estimation or for the purpose of the neuro-otologic status

- Determination of the need to rule out VIIIth nerve or central disorder CNS/CAP disorder and/or balance disorder
- Speech-Language Screening

Components of management include but are not limited to:

- Interpretation and documentation of assessment process results
- Development of recommendations for further audiologic follow-ups, including amplification, cochlear implants, or assistive devices
- Development of recommendations for audiologic follow-up and referral for and coordination with other services and for education, guidance and counseling as appropriate
- Provision of counseling and education to patient, family, and/or caregivers

Equipment and Test Environment: Testing is conducted as appropriate in an environment where ambient noise levels meet current American National Standards Institute (ANSI) standards. Electroacoustic equipment meets manufacturer's and the current ANSI standards for such equipment.

Safety and Health Precautions: All procedures ensure the safety of the patient and audiologist and adhere to Standard Health Precautions (e.g., prevention of bodily injury and transmission of infectious disease.)

References:

1. American National Standards Institute. (1981). Reference equivalent threshold force levels for audiometric bone vibrators [ANSI S3.1-1977 (1981)]. New York: Acoustical Society of America.
2. American National Standards Institute. (1986) Artificial headbone for the calibration of audiometer bone vibrators [ANSI S3.13-1972 (R1986)]. New York: Acoustical Society of America.
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4. American National Standards Institute. (1991). Maximum permissible ambient noise levels for audiometric test rooms [ANSI S3.1-1991]. New York: Acoustical Society of America.
5. American National Standards Institute. (1992). Method of manual pure-tone threshold audiometry (ANSI S3.21 1978 (R1992)). New York: Acoustical Society of America.
6. American National Standards Institute. (1996). Specifications for audiometers (ANSI S3.6-1996). New York: Acoustical Society of America.
7. American Speech-Language-Hearing Association. (1978). Manual pure-tone threshold audiometry. *ASHA*, 20(4), 297-301.
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9. American Speech-Language-Hearing Association. (1988). Guidelines for determining threshold level for speech. *ASHA*, 30(3), 85-89.
10. American Speech-Language-Hearing Association. (1990). Guidelines for audiometric symbols. *ASHA*, 32 (suppl. 2, 25-30).
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12. American Speech-Language-Hearing Association. (1993). Guidelines for audiology services in the schools. *ASHA*, 35 (Suppl. 10), 24-32.
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19. National Institutes of Health. (1993). Early Identification of hearing loss in infants and young children: Consensus development conference on early identification of hearing loss in infants and young children. Bethesda, MD: National Institutes of Health.
20. U.S. Department of Labor. Occupational exposure to blood-borne pathogens; Final rule. Occupational Safety and Health Administration: 29 CFR 1910.1030. Washington D.C.: Federal Register.
21. U.S. Department of Labor. Occupational exposure to blood-borne pathogens: Request for information. Occupational Safety and Health Administration. (Docket No. H370A). (September 9, 1998).