

Overview of the otitis media episode of care

State of Ohio

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1. CLINICAL OVERVIEW AND RATIONALE FOR DEVELOPING THE OTITIS MEDIA EPISODE

1.1 Rationale for developing the otitis media episode of care

Otitis media is one of the most common illnesses experienced by infants in the United States. Eighty percent of children will experience acute otitis media by the time they turn three.¹ Otitis media currently accounts for 3 billion dollars of the United States health care system.²

The American Academy of Otolaryngology–Head and Neck Surgery Foundation recognizes several types of otitis media, including acute, recurrent acute, chronic, suppurative, and effusive.³ Acute otitis media is short lasting, while chronic otitis media is continuous over a period of at least three months; however, recurrent acute otitis media is defined as three cases of otitis media within six months, or four cases within one year. Suppurative cases of otitis media, also occasionally referred to as acute otitis media (AOM) in clinical practice, include the presence of puss and inflammation caused by a bacterial infection. Effusive cases of otitis media, also called otitis media with effusion (OME), include fluid buildup in the ear that is non-infectious. All of these types of otitis media are included in the episode. In Ohio, there were 306,979 otitis media episodes among Medicaid beneficiaries over the age of six months and under the age of 20 in 2014, which represents approximately \$55 million in spend and a median episode cost of approximately \$104⁴.

Evidence-based clinical guidelines from the American Academy of Pediatrics and American Academy of Family Physicians and the American Academy of Otolaryngology–Head and Neck Surgery Foundation outline several best practices for clinicians to improve quality of care and outcomes for patients with both acute otitis media and otitis media with effusion.⁵ During the initial assessment, the

¹ Dhooge IJ. "Acute Otitis Media in Children." *Pediatric ENT* (2007): 399–420.

² Vergison, Anne, Ron Dagan, Adriano Arguedas, Jan Bonhoeffer, Robert Cohen, Ingeborg Dhooge, Alejandro Hoberman, Johannes Liese, Paola Marchisio, Arto A. Palmu, G. Thomas Ray, Elisabeth Am Sanders, Eric Af Simões, Matti Uhari, Johan Van Eldere, and Stephen I. Pelton. "Otitis Media and Its Consequences: Beyond the Earache." *The Lancet Infectious Diseases* 10.3 (2010): 195-203.

³ "Acute Otitis Media in Children." *Pediatric ENT* (n.d.): 399-411.

⁴ Analysis of Ohio Medicaid claims data for episodes ending between October 1, 2014 and September 30, 2015, Total episodes

⁵ Rosenfeld RM, Shin JJ, Schwartz SR, Coggins R, Gagnon L, Hackell JM, et al. "Clinical Practice Guideline: Otitis Media with Effusion (Update)." *Otolaryngol Head Neck Surg.* (2016): 154.

guidelines recommend pneumatic otoscopy to assess for otalgia or hearing loss, and also recommend tympanometry if the diagnosis is still uncertain after otoscopy.

The choice of treatment pathway, depends on whether the otitis media is identified as being suppurative or effusive. For patients with persistent chronic otitis media with effusion or for patients with recurrent acute otitis media, the guidelines recommend tympanostomy tube insertion for some children under four years or tympanostomy and adenoidectomy for some patients older than four years.

Treatment of otitis media varies from one provider to another despite these clinical guidelines. Antibiotic prescription rates have remained around 80 percent for cases within the US, despite a “watch and wait” strategy being recommended over antibiotic treatment in many cases.⁶ Although unique patient needs necessitate variation in treatment practice, variation not related to patient needs may lead to suboptimal patient outcomes, inappropriate utilization of resources, and/or higher than necessary costs.

Implementing the otitis media episode of care will incentivize evidence-based, guideline-concordant care through an outcomes-based payment model. Alongside other episodes of care and patient centered medical homes, the otitis media episode will contribute to a model of care delivery that benefits patients through improved care quality and clinical outcomes, and a lower overall cost of care.

1.2 Clinical overview and typical patient journey for the treatment of otitis media

Otitis media is a condition involving the inflammation or blockage of the middle ear. It can present with infected suppuration, or uninfected effusion of the middle ear.

The signs and symptoms of different types of otitis media (e.g., acute vs. chronic, suppurative vs. effusive) are similar and often difficult to distinguish in the clinical setting. Signs and symptoms of otitis media may include otorrhea, otalgia, and hearing loss. Individual instances of chronic otitis media follow a similar patient journey and have a similar spend profile as acute episodes.

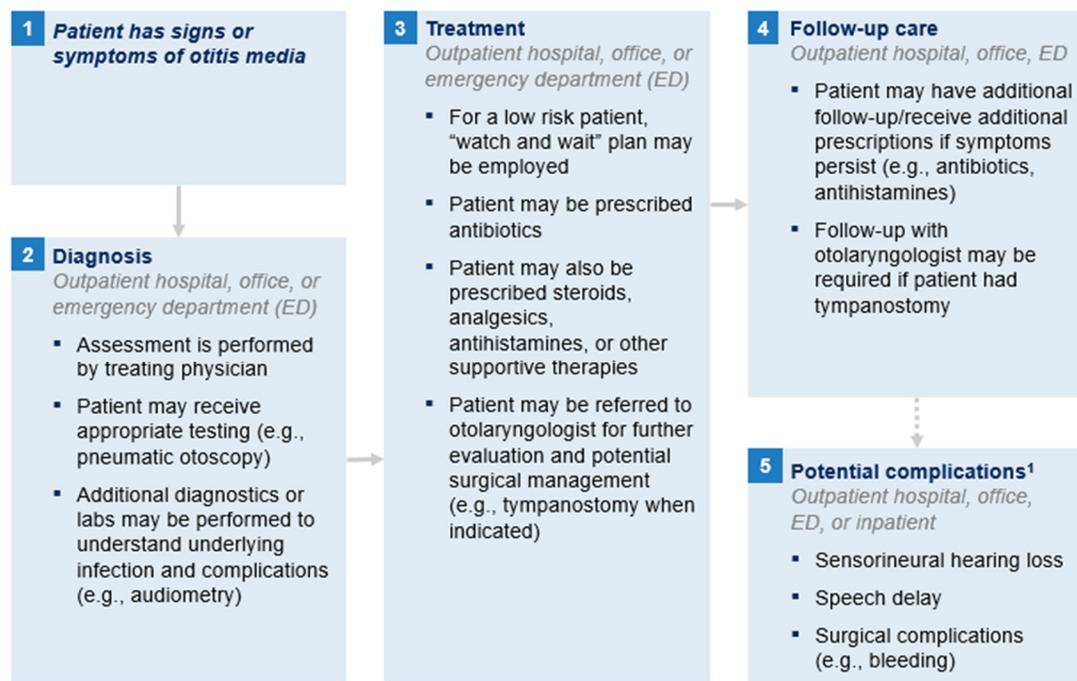
During the initial encounter, clinicians may use pneumatic otoscopy or tympanometry to properly diagnose patients presenting signs or symptoms of otitis media. In some cases, audiometry may be used to establish the presence or absence of hearing loss, an important and dangerous potential effect of blockage in the middle ear. After some form of otitis media has been diagnosed, the clinician will decide how to treat the otitis media. For patients with suppurative otitis media, antibiotics

⁶ Worrall G. Acute otitis media. *Can Fam Physician*. 2007;53(12):2147–2148.

may be prescribed during the initial encounter. For some low risk patients (including those with otitis media with effusion), the clinician may employ a watchful waiting strategy where the patient is sent home with specific instructions to observe and manage symptoms. If symptoms of suppurative otitis media among these patients worsen or fail to improve in 48 to 72 hours, the clinician may then prescribe an antibiotic regiment. Some patients may also be prescribed antihistamines, analgesics, or NSAIDs for supportive therapy.

If the effusion has persisted for longer than three months, the clinician may decide to test for hearing loss and subsequently refer the patient for a tympanostomy procedure. Under certain other circumstances, the clinician may also recommend adenoidectomy. Complications from these procedures can include bleeding, blood clots, infections, complications from anesthesia and breathing or pain related complications.

EXHIBIT 1 – OTITIS MEDIA PATIENT JOURNEY



¹ List of potential complications is not exhaustive

1.3 Potential sources of value within the patient journey

Within the otitis media episode, providers have several opportunities improve quality of care and reduce unnecessary spend associated with the episode (see Exhibit 2). For example, providers can follow best practice clinical guidelines to reduce unnecessary variation during the episode. This may require coordination between clinicians

diagnosing the otitis media and surgeons or other proceduralists performing any subsequent procedures (e.g., tympanostomy). The use of diagnostic procedures such as otoscopy or tympanometry can provide greater diagnostic certainty in certain cases. A clinician’s ability to properly diagnose whether the otitis media in question is suppurative or effusive is important in ensuring proper care. As well, clinicians can use audiometry tests to diagnose hearing loss so that it can be treated before it can lead to delays in the child’s speech development. These diagnostic measures, among others, can help ensure the appropriateness of potential surgical procedures (e.g., tympanostomy).

Clinicians can employ a watchful waiting strategy for low-risk patients, avoiding the prescription of antibiotics where not indicated, improving patient outcomes, and reducing costs. Clinicians can also reduce the frequency of non-indicated surgical procedures (e.g., tympanostomy, adenoidectomy) and ensure appropriate testing and follow-up care for surgical procedures that do occur. Finally, by using appropriate anticipatory management of symptoms and conditions that result from otitis media, clinicians may improve patient outcomes and quality of life while reducing unnecessary spend.

EXHIBIT 2 – OTITIS MEDIA SOURCES OF VALUE



2. OVERVIEW OF THE OTITIS MEDIA EPISODE DESIGN

2.1 Episode Trigger

An outpatient office or emergency department visit with a primary diagnosis of otitis media will trigger an otitis media episode. The triggering diagnosis list includes acute otitis media, chronic otitis media, or otitis media with effusion. Alternatively, an office visit with a primary diagnosis of a sign or symptom of otitis media (e.g., ear pain) with a secondary diagnosis of otitis media will trigger an episode (see Tables 1 and 2 in Appendix for the lists of trigger ICD-9 Dx codes).

2.2 Principal Accountable Provider

The principal accountable provider (PAP) is the person or entity best positioned to influence the patient journey and clinical decisions throughout the episode. For the otitis media episode, the PAP is the provider who diagnosed the otitis media. Because this provider is directly involved in the diagnosis, he or she is in the best position to promote adherence to guidelines, prevent complications, and influence other sources of value during its treatment.

2.3 Episode Duration

The otitis media episode begins with the triggering encounter where the diagnosis of otitis media is made (called the “trigger window”) and extends 30 days afterwards (called the “post-trigger window”). The 30-day post-trigger window was deemed an appropriate period of time to capture the majority of the medical and pharmaceutical treatments for otitis media. The post-trigger window can be extended if the patient is hospitalized on or before the 30th day and the admission extends beyond the 30th day. A 30-day post-trigger window was deemed necessary to capture spend associated with surgical procedures that may take place within a month of the triggering diagnosis (e.g. tympanostomy). The rationale for having one post-trigger window relates to included services and is described in greater detail in section 2.4.

2.4 Included Services

The episode model is designed to address spend for care and services directly related to the diagnosis, treatment, and immediate recovery phase for patients with an otitis media diagnosis. Each period of the patient journey, or episode “window,” has a distinct claim inclusion logic derived from two major criteria: 1) that the type of included care and services must correspond to that period of the patient journey and

2) that the included care and services are understood to be directly or indirectly influenced by the PAP during that period.

The otitis media episode is comprised of two distinct windows for the purpose of spend inclusions: a trigger window and a post-trigger window. During both windows, spend associated with care and treatment for otitis media is included, as well as care for the potential complications of surgical treatment. This includes specific associated care (e.g., spend associated with a relevant diagnosis like conductive hearing loss), evaluation and management encounters, imaging and testing (e.g., audiometry, tympanometry), pathology, and specific medications (e.g., amoxicillin). However, this is not meant to discourage diagnostic testing.

In order to make fair comparisons between episodes containing tympanostomy procedures and those without, the spend from tympanostomy procedures themselves is excluded from the episode. However, the spend surrounding a tympanostomy procedure, such as pre-surgical evaluations, follow-up care, and care for any complications is included spend.

Facility fee based spend from emergency department, urgent care center, and observation visits is specifically excluded from spend.

The total episode spend is calculated by adding the amounts of all the individual claims included in the episode.

2.5 Episode Exclusions and Risk Factors

To ensure that episodes are comparable across patient panels, select risk factors and exclusions are applied before assessing PAP performance. In the context of episode design, risk factors are attributes or underlying clinical conditions that are likely to impact a patient's course of care and the spend associated with a given episode. Exclusions are attributes or clinical conditions that cannot be adequately risk adjusted and that indicate either a distinct patient journey or incomparably high or low episode spend.

Risk factors are selected via a standardized and iterative risk-adjustment process based on Ohio-specific regression analysis that gives due consideration to clinical relevance, statistical significance, and other contextual factors.⁷ Based on the selected risk factors, each episode is assigned a risk score. The total episode spend and the risk score are used to arrive at an adjusted episode spend, which is the spend on

⁷ Garrett B., et al. (2014). Risk adjustment for retrospective episode-based payment: Guiding principles and proposed methodology. McKinsey Healthcare Systems and Services Practice. Available at <http://healthcare.mckinsey.com/risk-adjustment-retrospective-episode-based-payment> Accessed June 13, 2016

which providers are compared to each other. Table 3 in the Appendix lists potential risk factors, and Exhibit 6 presents an analysis of these risk factors. Note that the final list of risk factors will be determined after feedback from providers and the application of the statistical process described above.

By contrast, an episode is excluded from a patient panel when the patient has clinical factors that suggest he or she has experienced a distinct or different journey and/or that drive very significant increases in spend relative to the average patient. In addition, there are several “business-related” exclusions relating to reimbursement policy (e.g., whether a patient sought care out of state), the completeness of spend data for that patient (e.g., third-party liability or dual eligibility), and other topics relating to episode design and implementation, such as overlapping episodes, during the comparison period. Episodes with no exclusions are known as “valid” and used for provider comparisons. Episodes that have one of any of the exclusions are known as “invalid” episodes.

For the otitis media episode, both business and clinical exclusions apply. Several of the business and clinical exclusions are standard across most episodes, while others are specific to this otitis media episode. The episode specific clinical exclusions include congenital eustachian tube anomalies and age less than six months or greater than 20 years. The final list of exclusions will be determined based on feedback from providers and the risk-adjustment process. A list of business and clinical exclusions is in Table 4, and analysis of these exclusions is in Exhibit 7 in the Appendix.

2.6 Quality Metrics

To ensure the episode model incentivizes quality care, the otitis media episode has quality metrics. These are calculated for each PAP meeting the minimum threshold for valid episodes.

The otitis media episode has five proposed quality metrics. One is linked to performance assessment, meaning that performance thresholds on these metrics must be met for the episodes to be eligible for positive incentive payments within the episode model. The specific threshold amount will be determined during the informational reporting period. Four of the quality metrics are for informational purposes only.

The only metric tied to positive incentive payments is the percentage of episodes with decongestants filled. Informational metrics include the percentage episodes with antibiotics filled, the percentage of episodes with first-line antibiotics filled, the percentage of total valid episodes including a tympanostomy, and the percentage of valid episodes including a hearing test during the episode window. Detailed

descriptions of these metrics are in Table 5, and analysis of these quality metrics is in Exhibit 8 in the Appendix.

3. APPENDIX: SUPPORTING ANALYSES

Table 1 – Episode triggers

Trigger category	Trigger codes	Code type	Description
Otitis Media	H6500	ICD-10 Dx	Acute serous otitis media, unspecified ear
	H6501	ICD-10 Dx	Acute serous otitis media, right ear
	H6502	ICD-10 Dx	Acute serous otitis media, left ear
	H6503	ICD-10 Dx	Acute serous otitis media, bilateral
	H6504	ICD-10 Dx	Acute serous otitis media, recurrent, right ear
	H6505	ICD-10 Dx	Acute serous otitis media, recurrent, left ear
	H6506	ICD-10 Dx	Acute serous otitis media, recurrent, bilateral
	H6507	ICD-10 Dx	Acute serous otitis media, recurrent, unspecified ear
	H65111	ICD-10 Dx	Acute and subacute allergic otitis media (serous), r ear
	H65112	ICD-10 Dx	Acute and subacute allergic otitis media (serous), left ear
	H65113	ICD-10 Dx	Acute and subacute allergic otitis media (serous), bi
	H65114	ICD-10 Dx	Acute and subacute allergic otitis media, recur, r ear
	H65115	ICD-10 Dx	Acute and subacute allergic otitis media, recur, left ear
	H65116	ICD-10 Dx	Acute and subacute allergic otitis media (serous), recur, bi
	H65117	ICD-10 Dx	Acute and subacute allergic otitis media, recur, unsp ear

H65119	ICD-10 Dx	Acute and subacute allergic otitis media (serous), unsp ear
H65191	ICD-10 Dx	Other acute nonsuppurative otitis media, right ear
H65192	ICD-10 Dx	Other acute nonsuppurative otitis media, left ear
H65193	ICD-10 Dx	Other acute nonsuppurative otitis media, bilateral
H65194	ICD-10 Dx	Oth acute nonsuppurative otitis media, recurrent, right ear
H65195	ICD-10 Dx	Other acute nonsuppurative otitis media, recurrent, left ear
H65196	ICD-10 Dx	Oth acute nonsuppurative otitis media, recurrent, bilateral
H65197	ICD-10 Dx	Other acute nonsuppurative otitis media recurrent, unsp ear
H65199	ICD-10 Dx	Other acute nonsuppurative otitis media, unspecified ear
H6520	ICD-10 Dx	Chronic serous otitis media, unspecified ear
H6521	ICD-10 Dx	Chronic serous otitis media, right ear
H6522	ICD-10 Dx	Chronic serous otitis media, left ear
H6523	ICD-10 Dx	Chronic serous otitis media, bilateral
H6530	ICD-10 Dx	Chronic mucoid otitis media, unspecified ear
H6531	ICD-10 Dx	Chronic mucoid otitis media, right ear
H6532	ICD-10 Dx	Chronic mucoid otitis media, left ear
H6533	ICD-10 Dx	Chronic mucoid otitis media, bilateral
H65411	ICD-10 Dx	Chronic allergic otitis media, right ear

H65412	ICD-10 Dx	Chronic allergic otitis media, left ear
H65413	ICD-10 Dx	Chronic allergic otitis media, bilateral
H65419	ICD-10 Dx	Chronic allergic otitis media, unspecified ear
H65491	ICD-10 Dx	Other chronic nonsuppurative otitis media, right ear
H65492	ICD-10 Dx	Other chronic nonsuppurative otitis media, left ear
H65493	ICD-10 Dx	Other chronic nonsuppurative otitis media, bilateral
H65499	ICD-10 Dx	Other chronic nonsuppurative otitis media, unspecified ear
H6590	ICD-10 Dx	Unspecified nonsuppurative otitis media, unspecified ear
H6591	ICD-10 Dx	Unspecified nonsuppurative otitis media, right ear
H6592	ICD-10 Dx	Unspecified nonsuppurative otitis media, left ear
H6593	ICD-10 Dx	Unspecified nonsuppurative otitis media, bilateral
H66001	ICD-10 Dx	Acute suppr otitis media w/o spon rupt ear drum, right ear
H66002	ICD-10 Dx	Acute suppr otitis media w/o spon rupt ear drum, left ear
H66003	ICD-10 Dx	Acute suppr otitis media w/o spon rupt ear drum, bilateral
H66004	ICD-10 Dx	Ac suppr otitis media w/o spon rupt ear drum, recur, r ear

	H66005	ICD-10 Dx	Ac suppr otitis media w/o spon rupt ear drum, recur, l ear
	H66006	ICD-10 Dx	Acute suppr otitis media w/o spon rupt ear drum, recur, bi
	H66007	ICD-10 Dx	Ac suppr otitis media w/o spon rupt ear drum, recur, unsp ear
	H66009	ICD-10 Dx	Acute suppr otitis media w/o spon rupt ear drum, unsp ear
	H66011	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, right ear
	H66012	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, left ear
	H66013	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, bilateral
	H66014	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, recur, r ear
	H66015	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, recur, l ear
	H66016	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, recurrent, bi
	H66017	ICD-10 Dx	Ac suppr otitis media w spon rupt ear drum, recur, unsp ear
	H66019	ICD-10 Dx	Acute suppr otitis media w spon rupt ear drum, unsp ear
	H6610	ICD-10 Dx	Chronic tubotympanic suppurative otitis media, unspecified
	H6611	ICD-10 Dx	Chronic tubotympanic suppurative otitis media, right ear

H6612	ICD-10 Dx	Chronic tubotympanic suppurative otitis media, left ear
H6613	ICD-10 Dx	Chronic tubotympanic suppurative otitis media, bilateral
H6620	ICD-10 Dx	Chronic atticoantral suppurative otitis media, unsp ear
H6621	ICD-10 Dx	Chronic atticoantral suppurative otitis media, right ear
H6622	ICD-10 Dx	Chronic atticoantral suppurative otitis media, left ear
H6623	ICD-10 Dx	Chronic atticoantral suppurative otitis media, bilateral
H663X1	ICD-10 Dx	Other chronic suppurative otitis media, right ear
H663X2	ICD-10 Dx	Other chronic suppurative otitis media, left ear
H663X3	ICD-10 Dx	Other chronic suppurative otitis media, bilateral
H663X9	ICD-10 Dx	Other chronic suppurative otitis media, unspecified ear
H6640	ICD-10 Dx	Suppurative otitis media, unspecified, unspecified ear
H6641	ICD-10 Dx	Suppurative otitis media, unspecified, right ear
H6642	ICD-10 Dx	Suppurative otitis media, unspecified, left ear
H6643	ICD-10 Dx	Suppurative otitis media, unspecified, bilateral
H6690	ICD-10 Dx	Otitis media, unspecified, unspecified ear
H6691	ICD-10 Dx	Otitis media, unspecified, right ear
H6692	ICD-10 Dx	Otitis media, unspecified, left ear

H6693	ICD-10 Dx	Otitis media, unspecified, bilateral
H671	ICD-10 Dx	Otitis media in diseases classified elsewhere, right ear
H672	ICD-10 Dx	Otitis media in diseases classified elsewhere, left ear
H673	ICD-10 Dx	Otitis media in diseases classified elsewhere, bilateral
H679	ICD-10 Dx	Otitis media in diseases classified elsewhere, unsp ear
3813	ICD-9 Dx	Other And Unspecified Chronic Nonsuppurative Otitis Media
3814	ICD-9 Dx	Nonsuppurative Otitis Media Not Specified As Acute Or Chronic
3821	ICD-9 Dx	Chronic Tubotympanic Suppurative Otitis Media
3822	ICD-9 Dx	Chronic Atticoantral Suppurative Otitis Media
3823	ICD-9 Dx	Unspecified Chronic Suppurative Otitis Media
3824	ICD-9 Dx	Unspecified Suppurative Otitis Media
3829	ICD-9 Dx	Unspecified Otitis Media
38100	ICD-9 Dx	Acute Nonsuppurative Otitis Media Unspecified
38101	ICD-9 Dx	Acute Serous Otitis Media
38102	ICD-9 Dx	Acute Muroid Otitis Media
38103	ICD-9 Dx	Acute Sanguinous Otitis Media
38104	ICD-9 Dx	Acute Allergic Serous Otitis Media
38105	ICD-9 Dx	Acute Allergic Muroid Otitis Media

	38106	ICD-9 Dx	Acute Allergic Sanguinous Otitis Media
	38110	ICD-9 Dx	Chronic Serous Otitis Media Simple Or Unspecified
	38119	ICD-9 Dx	Other Chronic Serous Otitis Media
	38120	ICD-9 Dx	Chronic Muroid Otitis Media Simple Or Unspecified
	38129	ICD-9 Dx	Other Chronic Muroid Otitis Media
	38200	ICD-9 Dx	Acute Suppurative Otitis Media Without Spontaneous Rupture Of Eardrum
	38201	ICD-9 Dx	Acute Suppurative Otitis Media With Spontaneous Rupture Of Eardrum
	38202	ICD-9 Dx	Acute Suppurative Otitis Media In Diseases Classified Elsewhere

Table 2 – Contingent trigger diagnoses

Trigger category	Trigger codes	Code type	Description
Signs and symptoms of otitis media	B9710	ICD-10 Dx	Unspecified enterovirus as the cause of diseases classified elsewhere
	B9789	ICD-10 Dx	Other viral agents as the cause of diseases classified elsewhere
	F800	ICD-10 Dx	Phonological disorder
	F801	ICD-10 Dx	Expressive language disorder
	F804	ICD-10 Dx	Speech and language development delay due to hearing loss
	F8089	ICD-10 Dx	Other developmental disorders of speech and language

F809	ICD-10 Dx	Developmental disorder of speech and language, unspecified
G43009	ICD-10 Dx	Migraine without aura, not intractable, without status migrainosus
G43719	ICD-10 Dx	Chronic migraine without aura, intractable, without status migrainosus
G441	ICD-10 Dx	Vascular headache, not elsewhere classified
G933	ICD-10 Dx	Postviral fatigue syndrome
H60311	ICD-10 Dx	Diffuse otitis externa, right ear
H60312	ICD-10 Dx	Diffuse otitis externa, left ear
H60313	ICD-10 Dx	Diffuse otitis externa, bilateral
H60319	ICD-10 Dx	Diffuse otitis externa, unspecified ear
H60391	ICD-10 Dx	Other infective otitis externa, right ear
H60392	ICD-10 Dx	Other infective otitis externa, left ear
H60393	ICD-10 Dx	Other infective otitis externa, bilateral
H60399	ICD-10 Dx	Other infective otitis externa, unspecified ear
H60501	ICD-10 Dx	Unspecified acute noninfective otitis externa, right ear
H60502	ICD-10 Dx	Unspecified acute noninfective otitis externa, left ear
H60503	ICD-10 Dx	Unspecified acute noninfective otitis externa, bilateral
H60509	ICD-10 Dx	Unspecified acute noninfective otitis externa, unspecified ear
H60591	ICD-10 Dx	Other noninfective acute otitis externa, right ear

	H60592	ICD-10 Dx	Other noninfective acute otitis externa, left ear
	H60593	ICD-10 Dx	Other noninfective acute otitis externa, bilateral
	H60599	ICD-10 Dx	Other noninfective acute otitis externa, unspecified ear
	H6060	ICD-10 Dx	Unspecified chronic otitis externa, unspecified ear
	H6061	ICD-10 Dx	Unspecified chronic otitis externa, right ear
	H6062	ICD-10 Dx	Unspecified chronic otitis externa, left ear
	H6063	ICD-10 Dx	Unspecified chronic otitis externa, bilateral
	H608X1	ICD-10 Dx	Other otitis externa, right ear
	H608X2	ICD-10 Dx	Other otitis externa, left ear
	H608X3	ICD-10 Dx	Other otitis externa, bilateral
	H608X9	ICD-10 Dx	Other otitis externa, unspecified ear
	H6090	ICD-10 Dx	Unspecified otitis externa, unspecified ear
	H6091	ICD-10 Dx	Unspecified otitis externa, right ear
	H6092	ICD-10 Dx	Unspecified otitis externa, left ear
	H6093	ICD-10 Dx	Unspecified otitis externa, bilateral
	H628X1	ICD-10 Dx	Other disorders of right external ear in diseases classified elsewhere
	H628X2	ICD-10 Dx	Other disorders of left external ear in diseases classified elsewhere
	H628X3	ICD-10 Dx	Other disorders of external ear in diseases classified elsewhere, bilateral

	H628X9	ICD-10 Dx	Other disorders of external ear in diseases classified elsewhere, unspecified ear
	H6980	ICD-10 Dx	Other specified disorders of Eustachian tube, unspecified ear
	H6981	ICD-10 Dx	Other specified disorders of Eustachian tube, right ear
	H6982	ICD-10 Dx	Other specified disorders of Eustachian tube, left ear
	H6983	ICD-10 Dx	Other specified disorders of Eustachian tube, bilateral
	H6990	ICD-10 Dx	Unspecified Eustachian tube disorder, unspecified ear
	H6991	ICD-10 Dx	Unspecified Eustachian tube disorder, right ear
	H6992	ICD-10 Dx	Unspecified Eustachian tube disorder, left ear
	H6993	ICD-10 Dx	Unspecified Eustachian tube disorder, bilateral
	H7200	ICD-10 Dx	Central perforation of tympanic membrane, unspecified ear
	H7201	ICD-10 Dx	Central perforation of tympanic membrane, right ear
	H7202	ICD-10 Dx	Central perforation of tympanic membrane, left ear
	H7203	ICD-10 Dx	Central perforation of tympanic membrane, bilateral
	H7210	ICD-10 Dx	Attic perforation of tympanic membrane, unspecified ear

H7211	ICD-10 Dx	Attic perforation of tympanic membrane, right ear
H7212	ICD-10 Dx	Attic perforation of tympanic membrane, left ear
H7213	ICD-10 Dx	Attic perforation of tympanic membrane, bilateral
H722X1	ICD-10 Dx	Other marginal perforations of tympanic membrane, right ear
H722X2	ICD-10 Dx	Other marginal perforations of tympanic membrane, left ear
H722X3	ICD-10 Dx	Other marginal perforations of tympanic membrane, bilateral
H722X9	ICD-10 Dx	Other marginal perforations of tympanic membrane, unspecified ear
H72811	ICD-10 Dx	Multiple perforations of tympanic membrane, right ear
H72812	ICD-10 Dx	Multiple perforations of tympanic membrane, left ear
H72813	ICD-10 Dx	Multiple perforations of tympanic membrane, bilateral
H72819	ICD-10 Dx	Multiple perforations of tympanic membrane, unspecified ear
H72821	ICD-10 Dx	Total perforations of tympanic membrane, right ear
H72822	ICD-10 Dx	Total perforations of tympanic membrane, left ear
H72823	ICD-10 Dx	Total perforations of tympanic membrane, bilateral

H72829	ICD-10 Dx	Total perforations of tympanic membrane, unspecified ear
H7290	ICD-10 Dx	Unspecified perforation of tympanic membrane, unspecified ear
H7291	ICD-10 Dx	Unspecified perforation of tympanic membrane, right ear
H7292	ICD-10 Dx	Unspecified perforation of tympanic membrane, left ear
H7293	ICD-10 Dx	Unspecified perforation of tympanic membrane, bilateral
H7491	ICD-10 Dx	Unspecified disorder of right middle ear and mastoid
H7492	ICD-10 Dx	Unspecified disorder of left middle ear and mastoid
H7493	ICD-10 Dx	Unspecified disorder of middle ear and mastoid, bilateral
H8110	ICD-10 Dx	Benign paroxysmal vertigo, unspecified ear
H8111	ICD-10 Dx	Benign paroxysmal vertigo, right ear
H8112	ICD-10 Dx	Benign paroxysmal vertigo, left ear
H8113	ICD-10 Dx	Benign paroxysmal vertigo, bilateral
H81311	ICD-10 Dx	Aural vertigo, right ear
H81312	ICD-10 Dx	Aural vertigo, left ear
H81313	ICD-10 Dx	Aural vertigo, bilateral
H81319	ICD-10 Dx	Aural vertigo, unspecified ear
H81391	ICD-10 Dx	Other peripheral vertigo, right ear
H81392	ICD-10 Dx	Other peripheral vertigo, left ear

H81393	ICD-10 Dx	Other peripheral vertigo, bilateral
H81399	ICD-10 Dx	Other peripheral vertigo, unspecified ear
H8141	ICD-10 Dx	Vertigo of central origin, right ear
H8142	ICD-10 Dx	Vertigo of central origin, left ear
H8143	ICD-10 Dx	Vertigo of central origin, bilateral
H8149	ICD-10 Dx	Vertigo of central origin, unspecified ear
H8190	ICD-10 Dx	Unspecified disorder of vestibular function, unspecified ear
H8191	ICD-10 Dx	Unspecified disorder of vestibular function, right ear
H8192	ICD-10 Dx	Unspecified disorder of vestibular function, left ear
H8193	ICD-10 Dx	Unspecified disorder of vestibular function, bilateral
H832X3	ICD-10 Dx	Labyrinthine dysfunction, bilateral
H832X9	ICD-10 Dx	Labyrinthine dysfunction, unspecified ear
H833X1	ICD-10 Dx	Noise effects on right inner ear
H833X2	ICD-10 Dx	Noise effects on left inner ear
H833X3	ICD-10 Dx	Noise effects on inner ear, bilateral
H833X9	ICD-10 Dx	Noise effects on inner ear, unspecified ear
H8390	ICD-10 Dx	Unspecified disease of inner ear, unspecified ear
H8391	ICD-10 Dx	Unspecified disease of right inner ear
H8392	ICD-10 Dx	Unspecified disease of left inner ear
H8393	ICD-10 Dx	Unspecified disease of inner ear, bilateral

H900	ICD-10 Dx	Conductive hearing loss, bilateral
H9011	ICD-10 Dx	Conductive hearing loss, unilateral, right ear, with unrestricted hearing on the contralateral side
H9012	ICD-10 Dx	Conductive hearing loss, unilateral, left ear, with unrestricted hearing on the contralateral side
H902	ICD-10 Dx	Conductive hearing loss, unspecified
H903	ICD-10 Dx	Sensorineural hearing loss, bilateral
H9041	ICD-10 Dx	Sensorineural hearing loss, unilateral, right ear, with unrestricted hearing on the contralateral side
H9042	ICD-10 Dx	Sensorineural hearing loss, unilateral, left ear, with unrestricted hearing on the contralateral side
H905	ICD-10 Dx	Unspecified sensorineural hearing loss
H906	ICD-10 Dx	Mixed conductive and sensorineural hearing loss, bilateral
H9071	ICD-10 Dx	Mixed conductive and sensorineural hearing loss, unilateral, right ear, with unrestricted hearing on the contralateral side
H9072	ICD-10 Dx	Mixed conductive and sensorineural hearing loss, unilateral, left ear, with unrestricted hearing on the contralateral side
H908	ICD-10 Dx	Mixed conductive and sensorineural hearing loss, unspecified
H9101	ICD-10 Dx	Ototoxic hearing loss, right ear
H9102	ICD-10 Dx	Ototoxic hearing loss, left ear

H9103	ICD-10 Dx	Ototoxic hearing loss, bilateral
H9109	ICD-10 Dx	Ototoxic hearing loss, unspecified ear
H9120	ICD-10 Dx	Sudden idiopathic hearing loss, unspecified ear
H9121	ICD-10 Dx	Sudden idiopathic hearing loss, right ear
H9122	ICD-10 Dx	Sudden idiopathic hearing loss, left ear
H9123	ICD-10 Dx	Sudden idiopathic hearing loss, bilateral
H918X1	ICD-10 Dx	Other specified hearing loss, right ear
H918X2	ICD-10 Dx	Other specified hearing loss, left ear
H918X3	ICD-10 Dx	Other specified hearing loss, bilateral
H918X9	ICD-10 Dx	Other specified hearing loss, unspecified ear
H9190	ICD-10 Dx	Unspecified hearing loss, unspecified ear
H9191	ICD-10 Dx	Unspecified hearing loss, right ear
H9192	ICD-10 Dx	Unspecified hearing loss, left ear
H9193	ICD-10 Dx	Unspecified hearing loss, bilateral
H9201	ICD-10 Dx	Otalgia, right ear
H9202	ICD-10 Dx	Otalgia, left ear
H9203	ICD-10 Dx	Otalgia, bilateral
H9209	ICD-10 Dx	Otalgia, unspecified ear
H9210	ICD-10 Dx	Otorrhea, unspecified ear
H9211	ICD-10 Dx	Otorrhea, right ear
H9212	ICD-10 Dx	Otorrhea, left ear

H9213	ICD-10 Dx	Otorrhea, bilateral
H9220	ICD-10 Dx	Otorrhagia, unspecified ear
H9221	ICD-10 Dx	Otorrhagia, right ear
H9222	ICD-10 Dx	Otorrhagia, left ear
H9223	ICD-10 Dx	Otorrhagia, bilateral
H9311	ICD-10 Dx	Tinnitus, right ear
H9312	ICD-10 Dx	Tinnitus, left ear
H9313	ICD-10 Dx	Tinnitus, bilateral
H9319	ICD-10 Dx	Tinnitus, unspecified ear
H93231	ICD-10 Dx	Hyperacusis, right ear
H93232	ICD-10 Dx	Hyperacusis, left ear
H93233	ICD-10 Dx	Hyperacusis, bilateral
H93299	ICD-10 Dx	Other abnormal auditory perceptions, unspecified ear
I881	ICD-10 Dx	Chronic lymphadenitis, except mesenteric
J00	ICD-10 Dx	Acute nasopharyngitis [common cold]
J0100	ICD-10 Dx	Acute maxillary sinusitis, unspecified
J0101	ICD-10 Dx	Acute recurrent maxillary sinusitis
J0110	ICD-10 Dx	Acute frontal sinusitis, unspecified
J0111	ICD-10 Dx	Acute recurrent frontal sinusitis
J0120	ICD-10 Dx	Acute ethmoidal sinusitis, unspecified
J0121	ICD-10 Dx	Acute recurrent ethmoidal sinusitis
J0130	ICD-10 Dx	Acute sphenoidal sinusitis, unspecified

J0131	ICD-10 Dx	Acute recurrent sphenoidal sinusitis
J0140	ICD-10 Dx	Acute pansinusitis, unspecified
J0141	ICD-10 Dx	Acute recurrent pansinusitis
J0180	ICD-10 Dx	Other acute sinusitis
J0181	ICD-10 Dx	Other acute recurrent sinusitis
J0190	ICD-10 Dx	Acute sinusitis, unspecified
J0191	ICD-10 Dx	Acute recurrent sinusitis, unspecified
J020	ICD-10 Dx	Streptococcal pharyngitis
J028	ICD-10 Dx	Acute pharyngitis due to other specified organisms
J029	ICD-10 Dx	Acute pharyngitis, unspecified
J0300	ICD-10 Dx	Acute streptococcal tonsillitis, unspecified
J0301	ICD-10 Dx	Acute recurrent streptococcal tonsillitis
J0380	ICD-10 Dx	Acute tonsillitis due to other specified organisms
J0381	ICD-10 Dx	Acute recurrent tonsillitis due to other specified organisms
J0390	ICD-10 Dx	Acute tonsillitis, unspecified
J0391	ICD-10 Dx	Acute recurrent tonsillitis, unspecified
J040	ICD-10 Dx	Acute laryngitis
J050	ICD-10 Dx	Acute obstructive laryngitis [croup]
J060	ICD-10 Dx	Acute laryngopharyngitis
J069	ICD-10 Dx	Acute upper respiratory infection, unspecified

J200	ICD-10 Dx	Acute bronchitis due to Mycoplasma pneumoniae
J201	ICD-10 Dx	Acute bronchitis due to Hemophilus influenzae
J202	ICD-10 Dx	Acute bronchitis due to streptococcus
J203	ICD-10 Dx	Acute bronchitis due to coxsackievirus
J204	ICD-10 Dx	Acute bronchitis due to parainfluenza virus
J205	ICD-10 Dx	Acute bronchitis due to respiratory syncytial virus
J206	ICD-10 Dx	Acute bronchitis due to rhinovirus
J207	ICD-10 Dx	Acute bronchitis due to echovirus
J208	ICD-10 Dx	Acute bronchitis due to other specified organisms
J209	ICD-10 Dx	Acute bronchitis, unspecified
J300	ICD-10 Dx	Vasomotor rhinitis
J309	ICD-10 Dx	Allergic rhinitis, unspecified
J310	ICD-10 Dx	Chronic rhinitis
M2660	ICD-10 Dx	Temporomandibular joint disorder, unspecified
M2662	ICD-10 Dx	Arthralgia of temporomandibular joint
M2669	ICD-10 Dx	Other specified disorders of temporomandibular joint
Q161	ICD-10 Dx	Congenital absence, atresia and stricture of auditory canal (external)
Q169	ICD-10 Dx	Congenital malformation of ear causing impairment of hearing, unspecified

	Q909	ICD-10 Dx	Down syndrome, unspecified
	R05	ICD-10 Dx	Cough
	R110	ICD-10 Dx	Nausea
	R1110	ICD-10 Dx	Vomiting, unspecified
	R1111	ICD-10 Dx	Vomiting without nausea
	R1112	ICD-10 Dx	Projectile vomiting
	R112	ICD-10 Dx	Nausea with vomiting, unspecified
	R270	ICD-10 Dx	Ataxia, unspecified
	R278	ICD-10 Dx	Other lack of coordination
	R279	ICD-10 Dx	Unspecified lack of coordination
	R42	ICD-10 Dx	Dizziness and giddiness
	R454	ICD-10 Dx	Irritability and anger
	R4583	ICD-10 Dx	Excessive crying of child, adolescent or adult
	R502	ICD-10 Dx	Drug induced fever
	R5081	ICD-10 Dx	Fever presenting with conditions classified elsewhere
	R509	ICD-10 Dx	Fever, unspecified
	R51	ICD-10 Dx	Headache
	R530	ICD-10 Dx	Neoplastic (malignant) related fatigue
	R531	ICD-10 Dx	Weakness
	R5381	ICD-10 Dx	Other malaise
	R5383	ICD-10 Dx	Other fatigue

R620	ICD-10 Dx	Delayed milestone in childhood
R630	ICD-10 Dx	Anorexia
R6811	ICD-10 Dx	Excessive crying of infant (baby)
R6812	ICD-10 Dx	Fussy infant (baby)
R6883	ICD-10 Dx	Chills (without fever)
R6884	ICD-10 Dx	Jaw pain
R6889	ICD-10 Dx	Other general symptoms and signs
Z0110	ICD-10 Dx	Encounter for examination of ears and hearing without abnormal findings
Z822	ICD-10 Dx	Family history of deafness and hearing loss
Z8352	ICD-10 Dx	Family history of ear disorders
0340	ICD-9 Dx	Streptococcal Sore Throat
460	ICD-9 Dx	Acute Nasopharyngitis (Common Cold)
462	ICD-9 Dx	Acute Pharyngitis
463	ICD-9 Dx	Acute Tonsillitis
2891	ICD-9 Dx	Chronic Lymphadenitis
3819	ICD-9 Dx	Unspecified Eustachian Tube Disorder
3859	ICD-9 Dx	Unspecified Disorder Of Middle Ear And Mastoid
3862	ICD-9 Dx	Vertigo Of Central Origin
3869	ICD-9 Dx	Unspecified Vertiginous Syndromes And Labyrinthine Disorders
3882	ICD-9 Dx	Sudden Hearing Loss Unspecified
3898	ICD-9 Dx	Other Specified Forms Of Hearing Loss

	3899	ICD-9 Dx	Unspecified Hearing Loss
	4610	ICD-9 Dx	Acute Maxillary Sinusitis
	4611	ICD-9 Dx	Acute Frontal Sinusitis
	4612	ICD-9 Dx	Acute Ethmoidal Sinusitis
	4613	ICD-9 Dx	Acute Sphenoidal Sinusitis
	4618	ICD-9 Dx	Other Acute Sinusitis
	4619	ICD-9 Dx	Acute Sinusitis Unspecified
	4650	ICD-9 Dx	Acute Laryngopharyngitis
	4658	ICD-9 Dx	Acute Upper Respiratory Infections Of Other Multiple Sites
	4659	ICD-9 Dx	Acute Upper Respiratory Infections Of Unspecified Site
	4660	ICD-9 Dx	Acute Bronchitis
	4720	ICD-9 Dx	Chronic Rhinitis
	4779	ICD-9 Dx	Allergic Rhinitis Cause Unspecified
	7580	ICD-9 Dx	Down'S Syndrome
	7804	ICD-9 Dx	Dizziness And Giddiness
	7813	ICD-9 Dx	Lack Of Coordination
	7840	ICD-9 Dx	Headache
	7841	ICD-9 Dx	Throat Pain
	7862	ICD-9 Dx	Cough
	07999	ICD-9 Dx	Unspecified Viral Infection
	31531	ICD-9 Dx	Expressive Language Disorder

31534	ICD-9 Dx	Speech And Language Developmental Delay Due To Hearing Loss
31539	ICD-9 Dx	Other Developmental Speech Disorder
34610	ICD-9 Dx	Migraine Without Aura Without Mention Of Intractable Migraine Without Mention Of Status Migrainosus
34671	ICD-9 Dx	Chronic Migraine Without Aura With Intractable Migraine So Stated Without Mention Of Status Migrainosus
38010	ICD-9 Dx	Infective Otitis Externa Unspecified
38015	ICD-9 Dx	Chronic Mycotic Otitis Externa
38016	ICD-9 Dx	Other Chronic Infective Otitis Externa
38022	ICD-9 Dx	Other Acute Otitis Externa
38023	ICD-9 Dx	Other Chronic Otitis Externa
38181	ICD-9 Dx	Dysfunction Of Eustachian Tube
38189	ICD-9 Dx	Other Disorders Of Eustachian Tube
38420	ICD-9 Dx	Perforation Of Tympanic Membrane Unspecified
38421	ICD-9 Dx	Central Perforation Of Tympanic Membrane
38422	ICD-9 Dx	Attic Perforation Of Tympanic Membrane
38423	ICD-9 Dx	Other Marginal Perforation Of Tympanic Membrane
38424	ICD-9 Dx	Multiple Perforations Of Tympanic Membrane
38425	ICD-9 Dx	Total Perforation Of Tympanic Membrane
38610	ICD-9 Dx	Peripheral Vertigo Unspecified

38611	ICD-9 Dx	Benign Paroxysmal Positional Vertigo
38619	ICD-9 Dx	Other Peripheral Vertigo
38656	ICD-9 Dx	Loss Of Labyrinthine Reactivity Bilateral
38812	ICD-9 Dx	Noise-Induced Hearing Loss
38830	ICD-9 Dx	Tinnitus Unspecified
38831	ICD-9 Dx	Subjective Tinnitus
38832	ICD-9 Dx	Objective Tinnitus
38840	ICD-9 Dx	Abnormal Auditory Perception Unspecified
38842	ICD-9 Dx	Hyperacusis
38860	ICD-9 Dx	Otorrhea Unspecified
38869	ICD-9 Dx	Other Otorrhea
38870	ICD-9 Dx	Otalgia Unspecified
38871	ICD-9 Dx	Otogenic Pain
38872	ICD-9 Dx	Referred Otogenic Pain
38900	ICD-9 Dx	Conductive Hearing Loss Unspecified
38901	ICD-9 Dx	Conductive Hearing Loss External Ear
38902	ICD-9 Dx	Conductive Hearing Loss Tympanic Membrane
38903	ICD-9 Dx	Conductive Hearing Loss Middle Ear
38904	ICD-9 Dx	Conductive Hearing Loss Inner Ear
38905	ICD-9 Dx	Conductive Hearing Loss Unilateral
38906	ICD-9 Dx	Conductive Hearing Loss Bilateral

	38908	ICD-9 Dx	Conductive Hearing Loss Of Combined Types
	38910	ICD-9 Dx	Sensorineural Hearing Loss Unspecified
	38911	ICD-9 Dx	Sensory Hearing Loss Bilateral
	38912	ICD-9 Dx	Neural Hearing Loss Bilateral
	38913	ICD-9 Dx	Neural Hearing Loss Unilateral
	38914	ICD-9 Dx	Central Hearing Loss
	38915	ICD-9 Dx	Sensorineural Hearing Loss Unilateral
	38916	ICD-9 Dx	Sensorineural Hearing Loss Asymmetrical
	38917	ICD-9 Dx	Sensory Hearing Loss Unilateral
	38918	ICD-9 Dx	Sensorineural Hearing Loss Bilateral
	38920	ICD-9 Dx	Mixed Hearing Loss Unspecified
	38921	ICD-9 Dx	Mixed Hearing Loss Unilateral
	38922	ICD-9 Dx	Mixed Hearing Loss Bilateral
	46400	ICD-9 Dx	Acute Laryngitis Without Obstruction
	46401	ICD-9 Dx	Acute Laryngitis With Obstruction
	52460	ICD-9 Dx	Temporomandibular Joint Disorders Unspecified
	52462	ICD-9 Dx	Temporomandibular Joint Disorders Arthralgia Of Temporomandibular Joint
	52469	ICD-9 Dx	Temporomandibular Joint Disorders Other Specified Temporomandibular Joint Disorders
	74400	ICD-9 Dx	Unspecified Congenital Anomaly Of Ear With Impairment Of Hearing

74402	ICD-9 Dx	Other Congenital Anomalies Of External Ear With Impairment Of Hearing
74409	ICD-9 Dx	Other Congenital Anomalies Of Ear Causing Impairment Of Hearing
78060	ICD-9 Dx	Fever Unspecified
78061	ICD-9 Dx	Fever Presenting With Conditions Classified Elsewhere
78064	ICD-9 Dx	Chills (Without Fever)
78079	ICD-9 Dx	Other Malaise And Fatigue
78091	ICD-9 Dx	Fussy Infant (Baby)
78092	ICD-9 Dx	Excessive Crying Of Infant (Baby)
78095	ICD-9 Dx	Excessive Crying Of Child Adolescent Or Adult
78342	ICD-9 Dx	Delayed Milestones
78492	ICD-9 Dx	Jaw Pain
78701	ICD-9 Dx	Nausea With Vomiting
78702	ICD-9 Dx	Nausea Alone
78703	ICD-9 Dx	Vomiting Alone
78791	ICD-9 Dx	Diarrhea
79922	ICD-9 Dx	Irritability
V192	ICD-9 Dx	Family History Of Deafness Or Hearing Loss
V193	ICD-9 Dx	Family History Of Other Ear Disorders
V202	ICD-9 Dx	Routine Infant Or Child Health Check
V412	ICD-9 Dx	Problems With Hearing

	V700	ICD-9 Dx	Routine General Medical Examination At A Health Care Facility
	V7219	ICD-9 Dx	Other Examination Of Ears And Hearing

Table 3 – Potential episode risk factors

Risk factor	Relevant time period
Age 6 to 35 months	During the episode
Age 3 to 11 years	During the episode
Recurrent OM One Year	During the episode window and 365 days before the episode window
Recurrent OM Six Month	During the episode window and 180 days before the episode window
Asthma	During the episode window and 365 days before the episode window
Chronic Sinusitis	During the episode window and 365 days before the episode window
Pleurisy; Pneumothorax; Pulmonary collapse	During the episode window and 365 days before the episode window
Respiratory Failure; Insufficiency; Arrest	During the episode window and 365 days before the episode window
Cleft Palate	During the episode window and 365 days before the episode window
Craniofacial Abnormalities	During the episode window and 365 days before the episode window
Mastoiditis	During the episode window and 365 days before the episode window
Language Disorders	During the episode window and 365 days before the episode window
Developmental Delays and Disorders	During the episode window and 365 days before the episode window

Risk factor	Relevant time period
Relevant Genetic Disorders	During the episode window and 365 days before the episode window
Hearing Loss	During the episode window and 365 days before the episode window
Fluid and Electrolyte Disorders	During the episode window and 365 days before the episode window
Nutrition Deficiencies	During the episode window and 365 days before the episode window
Immune Disorders	During the episode window and 365 days before the episode window
Relevant Neurological Disorders	During the episode window and 365 days before the episode window
Allergic Reactions	During the trigger window and 365 days before the episode window
Coagulation Disorders	During the episode window and 365 days before the episode window
Congenital Malformations of Ear	During the episode window and 365 days before the episode window
Specific Developmental Disorders of Speech	During the episode window and 365 days before the episode window
Bronchiolitis	30 days before the trigger window
Pervasive developmental disorders	During the episode window and 365 days before the episode window

Table 4 – Potential episode exclusions

Exclusion type	Episode exclusion	Description	Relevant time period
Business exclusion	Out of state	PAP operates out of state	N/A
	No PAP	An episode is excluded if the PAP cannot be identified	During the episode window
	Enrollment	Patient is not enrolled in Medicaid	During the episode window
	Third party liability	An episode is excluded if third-party liability charges are present on any claim or claim detail line or if the patient has relevant third-party coverage at any time	During the episode window
	Multi payer	An episode is excluded if a patient changes enrollment between FFS and an MCP or between MCPs	During the episode window
	Dual	An episode is excluded if the patient had dual coverage by Medicare and Medicaid	During the episode window
	No DRG	An episode is excluded if a DRG-paid inpatient claim is missing the APR-DRG and severity of illness	During the episode window
	Left against medical advice	Patient has discharge status of “left against medical advice”	During the episode window
	Death	An episode is excluded if the patient has a discharge status of “expired” on any inpatient or outpatient claim	During the episode window
	Long admission	An episode is excluded if the patient has one or more hospital admissions for a duration greater than 30 days	During the episode window
	Long term care	An episode is excluded if the patient has one or more long-term care claim detail lines which overlap the episode window	During the episode window
Standard clinical exclusion	Cancer treatment	Patient has diagnosis of cancer and procedures for active management of cancer	During the episode or up to 90 days before the start of the episode

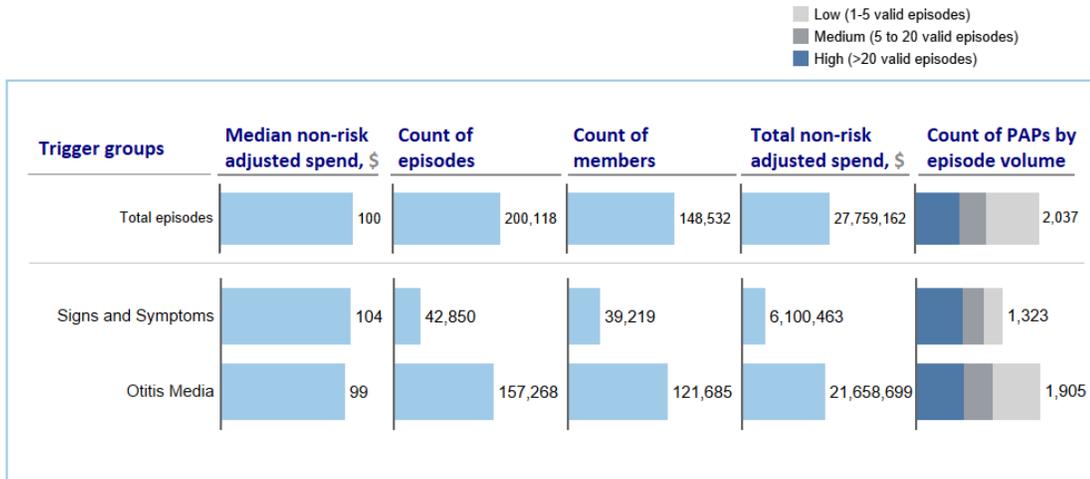
Exclusion type	Episode exclusion	Description	Relevant time period
	ESRD	Patient has diagnosis or procedure for end stage renal disease	During the episode or up to 365 days before the start of the episode
	Cystic fibrosis	Patient has diagnosis of cystic fibrosis during the episode	During the episode or up to 365 days before the start of the episode
	Multiple sclerosis	Patient has diagnosis of multiple sclerosis	During the episode window or during 365 days before the start of the episode
	Coma	Patient has diagnosis of coma during the episode	During the episode or up to 365 days before the start of the episode
	Transplant	An episode is excluded if a patient has an organ transplant	During the episode or up to 365 days before the start of the episode
	Paralysis	Patient has diagnosis of paralysis	During the episode or up to 365 days before the start of the episode
	HIV	Patient has diagnosis of HIV	During the episode or up to 365 days before the start of the episode
Episode-specific clinical exclusion	Age	Patient is older than 20 years or younger than 6 months	During the episode window
	Congenital eustachian tube anomalies	Patient is diagnosed with a eustachian tube anomaly	During the episode or up to 365 days before the start of the episode

Exclusion type	Episode exclusion	Description	Relevant time period
	Abortion	Patient has a diagnosis of abortion	During the episode window and 365 days before the episode window
	CNS infection	Patient has a diagnosis of a CNS infection	During the episode window and 365 days before the episode window
	Drowning	Patient has a diagnosis of drowning	During the episode window and 365 days before the episode window
	Intracranial abscess	Patient has a diagnosis of intracranial abscess	During the trigger window and 365 days before the episode window
	Precerebral occlusion	Patient has a diagnosis of precerebral occlusion	During the episode window and 365 days before the episode window
	Respiratory distress syndrome	Patient has a diagnosis of respiratory distress syndrome	During the episode window and 365 days before the episode window
	Shock	Patient has a diagnosis of shock	During the trigger window and 365 days before the episode window
	Concurrent tonsillectomy	Patient has a tonsillectomy procedure	During the episode
	Concurrent adenoidectomy	Patient has an adenoidectomy procedure	During the episode

Table 5 – Episode quality metrics (PAP level)

Metric type	Quality metric	Description	Relevant time period
Tied to incentive payments	Decongestants filled	Percentage of valid episodes that have a filled prescription for decongestants (lower rate indicative of better performance)	During the episode window
Informational	Antibiotics filled	Percentage of valid episodes that have a filled prescription for antibiotics (higher rate indicative of better performance)	During the episode window
Informational	First-line antibiotics	Percentage of valid episodes that have a filled prescription for antibiotics, where the antibiotic is a first-line antibiotic (rate provided for comparison only)	During the episode window
Informational	Overall tympanostomy	Percentage of total episodes (valid and invalid) with tympanostomy performed in the episode window (rate provided for comparison only)	During the episode window
Informational	Audiometry	Percentage of valid episodes including a hearing test during the episode window	During the episode window

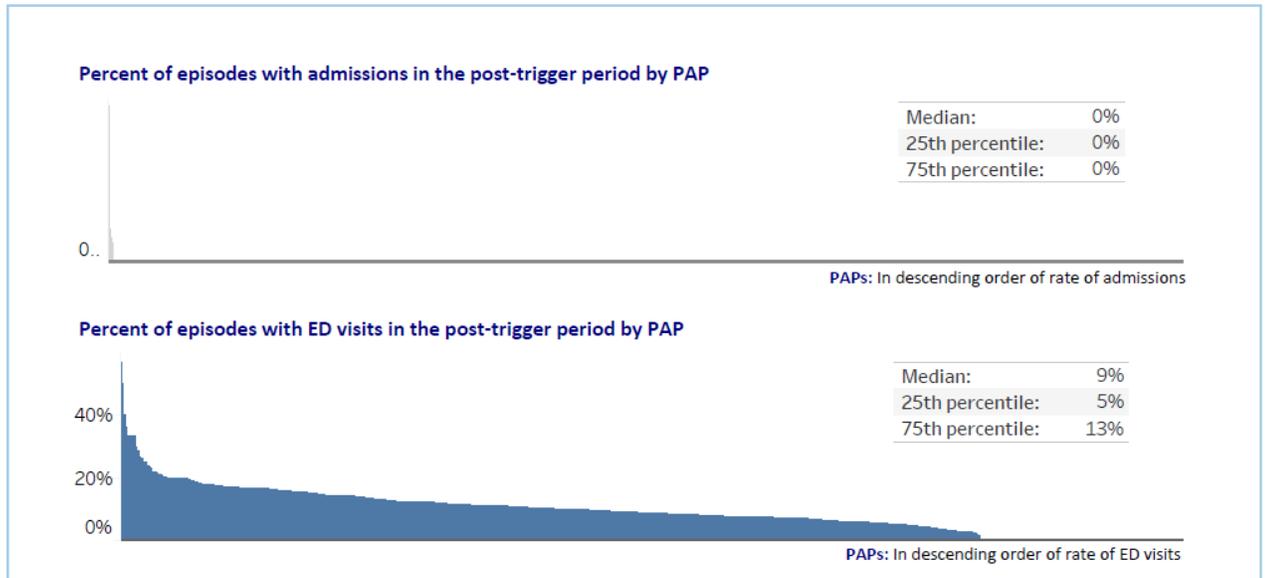
EXHIBIT 3 – OTITIS MEDIA TRIGGER GROUPS¹



¹ For valid episodes (200,118) across all PAPs; valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

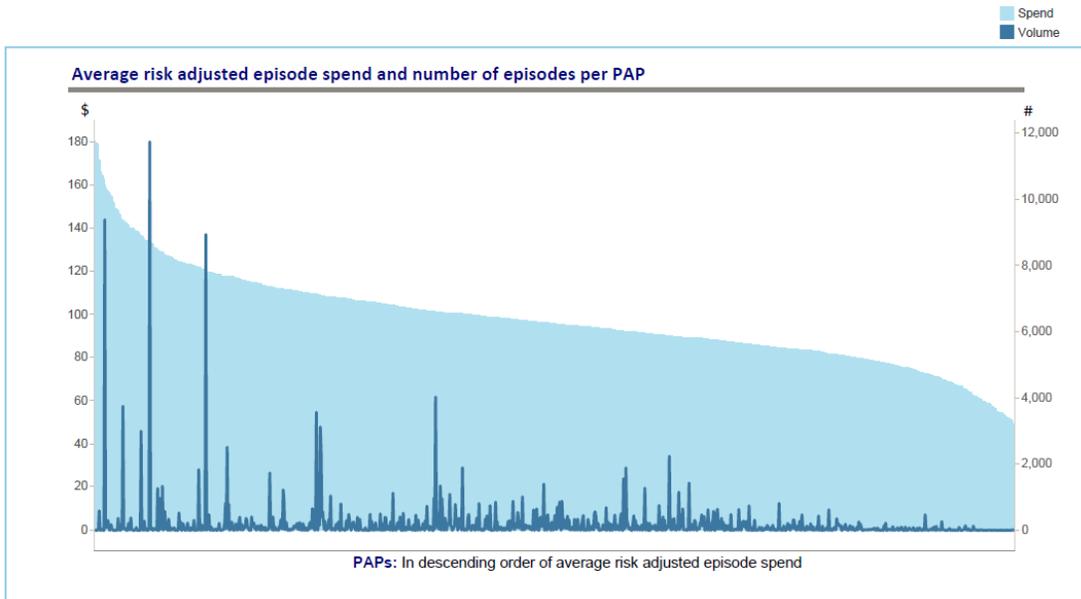
EXHIBIT 4 – VARIATION IN POST-TRIGGER ADMISSION AND ED VISIT RATES BY PAP¹



¹ For valid episodes (198,550) across PAPs with 5 or more valid episodes (1,166); valid episodes for PAPs with 4 or less episodes are not included in this analysis; valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD). 1,162 PAPs have zero episodes with admissions and 222 PAPs have zero episodes with ED visits.

SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

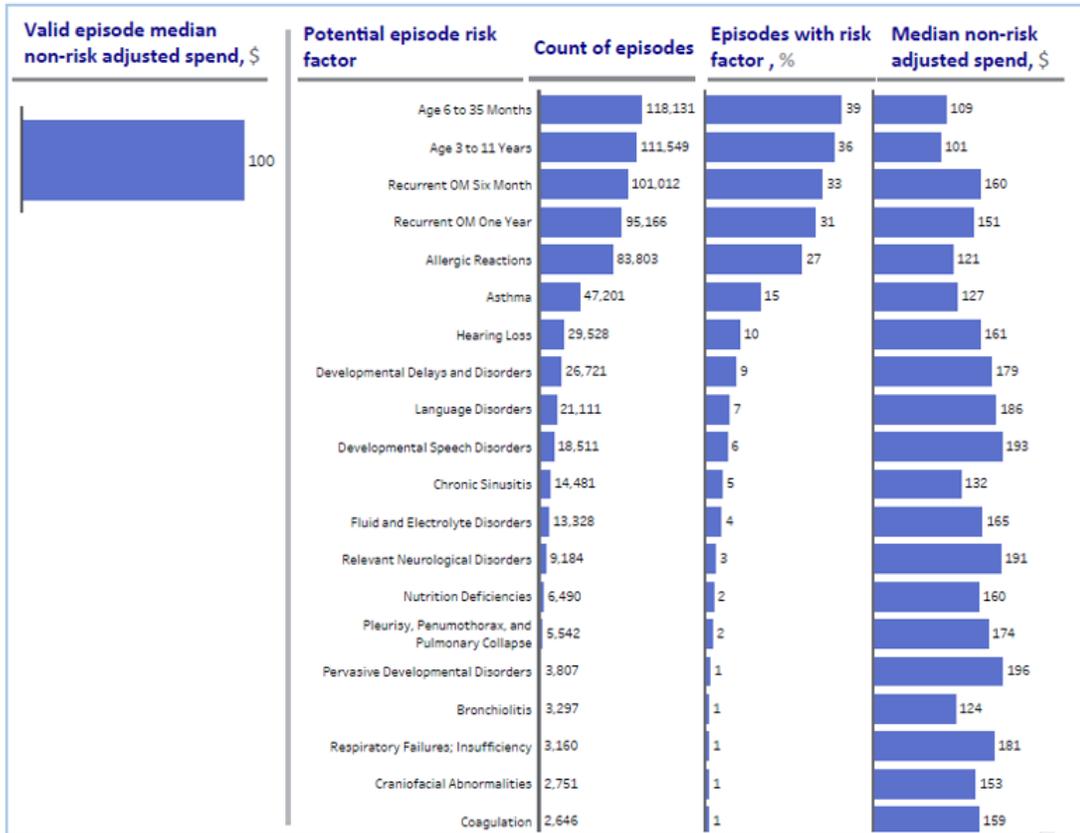
EXHIBIT 5 – DISTRIBUTION OF NON-RISK ADJUSTED AVERAGE EPISODE SPEND AND COUNT BY PAP¹



¹ For valid episodes (198,550) across PAPs with 5 or more valid episodes (1,166); valid episodes for PAPs with 4 or less episodes are not included in this analysis; valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 6 – EPISODE COUNT AND SPEND BY POTENTIAL EPISODE RISK FACTOR^{1,2,3}



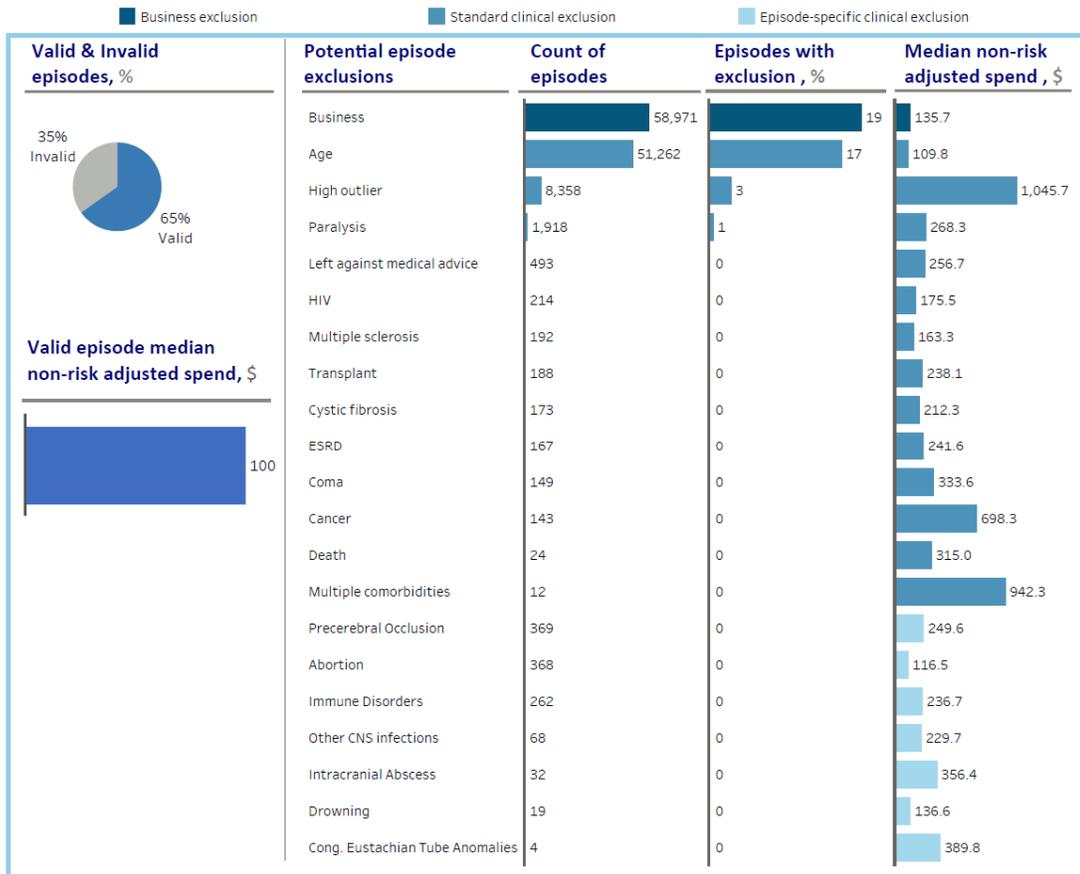
1 200,118 valid episodes across all PAPs; valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

2 For episodes with this potential risk factor; one episode can have multiple risk factors

3 Showing a selection of risk factors

SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 7 – EPISODE COUNT AND SPEND BY POTENTIAL EPISODE EXCLUSION^{1,2}

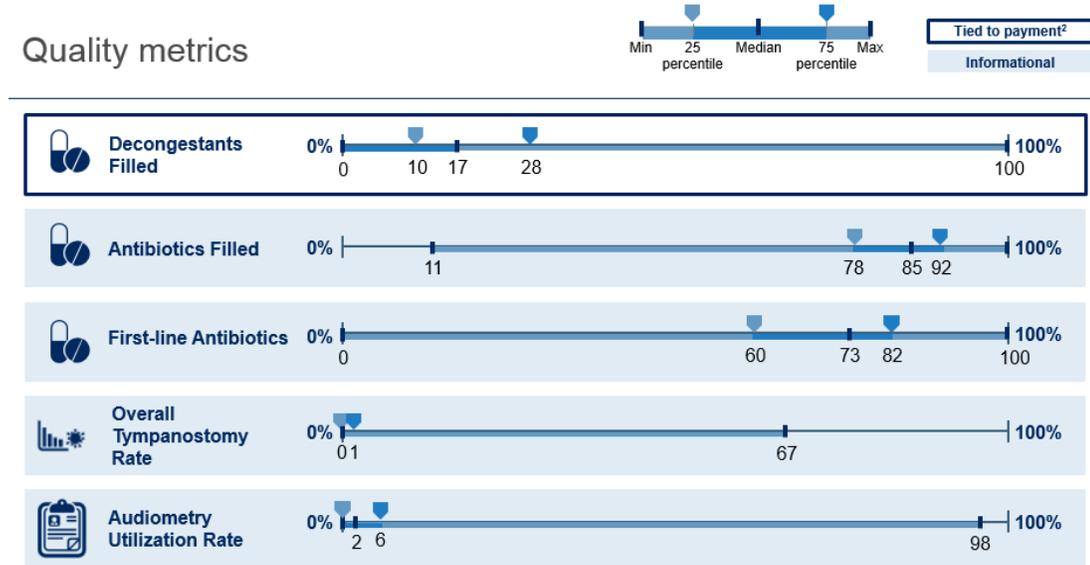


1 For episodes with this potential exclusion; one episode can have multiple exclusions

2 Age exclusion excludes patients younger than six months or older than twenty

SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 8 - PAP PERFORMANCE ON PROPOSED EPISODE QUALITY METRICS¹



1 For valid episodes (198,550) across PAPs with 5 or more valid episodes (1,166); valid episodes for PAPs with 4 or less episodes are not included in this analysis; valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

2 Metric tied to positive incentive payments

SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015