Ann Allergy Asthma Immunol 118 (2017) 127–132

Contents lists available at ScienceDirect

Perspective

Perspectives on the *International Classification of Diseases, 11th Revision*, developments in allergy clinical practice in the United States

Luciana Kase Tanno, MD, PhD [*,†,‡]; James L. Sublett, MD [§,||]; J. Allen Meadows, MD [¶]; Moises Calderon, MD, PhD [#]; Garry N. Gross, MD [**]; Thomas Casale, MD [††]; Pascal Demoly, MD, PhD [†,‡]; on behalf of the Joint Allergy Academies

[*] *Hospital Sírio Libanês, São Paulo, Brazil*
[†] *University Hospital of Montpellier, Montpellier, France*
[‡] *Sorbonne Universités, Paris, France*
[§] *Family Allergy & Asthma, Louisville, Kentucky*
[||] *Section of Allergy & Immunology, Department of Pediatrics, University of Louisville School of Medicine, Louisville, Kentucky*
[¶] *Alabama College of Osteopathic Medicine, Dothan, Alabama*
[#] *Section of Allergy and Clinical Immunology, Imperial College London, National Heart and Lung Institute, Royal Brompton Hospital, London, United Kingdom*
[**] *Department of Medicine, University of Texas Southwestern Medical School, Dallas, Texas*
[††] *Morsani College of Medicine, University of South Florida, Tampa, Florida*

ARTICLE INFO

Article history:
Received for publication October 6, 2016.
Received in revised form November 3, 2016.
Accepted for publication November 8, 2016.

Why Should We Start Discussions Regarding *ICD-11* in the United States?

ICD

The *International Classification of Diseases* (*ICD*) has been in use as a recognized global classification system since 1900, when the first version was launched.[1] Its development and continuing evolution reflect the untiring efforts of many experts and contributors. The *ICD* is revised periodically, and respective updates are gradually adopted and implemented in participating countries. Currently, the *International Classification of Diseases, Tenth Revision* (*ICD-10*) is in use in more than 100 countries worldwide, translated in 43 different languages, and used as a common language for reporting and monitoring diseases to achieve the standard of being a universal classification.[2]

Reprints: Luciana Kase Tanno, MD, PhD, Division of Allergy, Department of Pulmonology, Hôpital Arnaud de Villeneuve, University Hospital of Montpellier, 371, av. du Doyen Gaston Giraud 34295, Montpellier Cedex 5, France; E-mail: luciana.tanno@gmail.com.

Disclosures: Authors have nothing to disclose.

Funding Sources: Drs Tanno and Demoly received an unrestricted AstraZeneca ERS-16-11927 grant through University Hospital of Montpellier administration.

The Joint Allergy Academies include the American Academy of Allergy, Asthma and Immunology; European Academy of Allergy and Clinical Immunology; World Allergy Organization; American College of Allergy, Asthma and Immunology; Asia Pacific Association of Allergy, Asthma and Clinical Immunology; Latin American Society of Allergy, Asthma and Immunology; and Asia Pacific Association of Pediatric Allergy, Respirology & Immunology.

Historic Background of the ICD in the United States

Together with several other countries, the United States has adopted the *ICD* system of classifying medical diagnosis and procedures as the basis of the coding system. The *ICD* system is used worldwide as a public health tool to monitor mortality and morbidity, as well as other important epidemiologic variables. Different from much of the rest of the world, the United States also uses the *ICD* system to determine health care payment and reimbursement of practitioners and health care services in hospitals. Since the 1960s, some countries have created national modifications of the *ICD* for their own use, and these contain more specific information or details that can be found in the World Health Organization (WHO) *ICD* (eg, Australia has the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification*, Canada has the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Canada*, and the United States has the *International Classification of Diseases, Tenth Revision, Clinical Modification* [*ICD-10-CM*]). All updates to the main *ICD* are performed through the WHO. The *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) has been used in the United States since 1977. In 1990, the WHO released the 10th revision of the *ICD*, and the United States started the development of national adaptation in 1998, creating the *ICD-10-CM*. American health care practitioners and payers were initially scheduled to adopt the *ICD-10-CM* in 2008, but the Centers for Medicare & Medicaid Services (CMS) pushed back the deadline.[3] The reason given was that the conversion required health care practitioners and payers to

http://dx.doi.org/10.1016/j.anai.2016.11.003

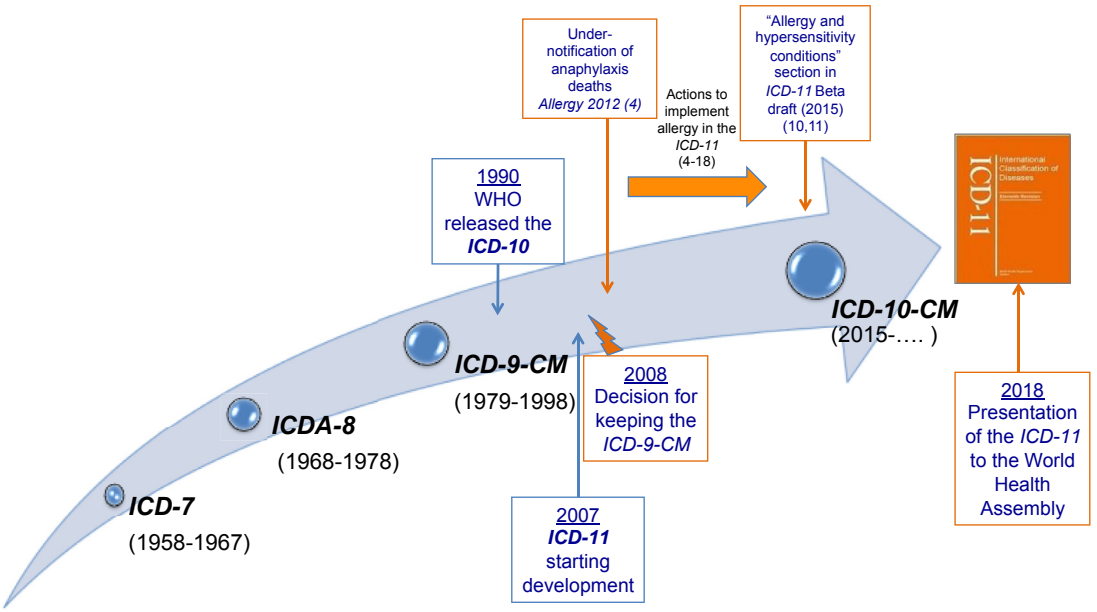

Figure 1. Historic background of the *International Classification of Diseases* (*ICD*) in the United States and the *Allergy in ICD-11* Initiative. ICD, *International Classification of Diseases;* WHO, *World Health Organization.*

adapt their information system to accommodate an increase in new diagnostic codes. The *ICD-10-CM* was finally launched in 1st October 2015 (Fig 1) and now is mandated for all medical reporting. The CMS also announced a 1-year grace period, allowing for payment even if codes were not correct as long as they were in the same family. In contrast to the 14,000 *ICD-9-CM* codes, it covers more than 70,000 codes to reach more specificity.

In development since 2007, *ICD-11* is intended not only to rectify deficiencies in *ICD-10* and to incorporate changes demanded by scientific advances but also to take advantage of the possibility of electronic data handling since the publication of *ICD-10* a quarter of a century ago.[2] The final version of *ICD-11* is intended to be presented to the World Health Assembly in 2018. Once the *ICD-11* is approved and available, all the countries currently using national modifications specific for their country will be advised to move to the *ICD-11.*

To create a more appropriate classification for allergic and hypersensitivity conditions in *ICD-11*, a structured and detailed action plan (Fig 2) has been built by providing scientific evidence

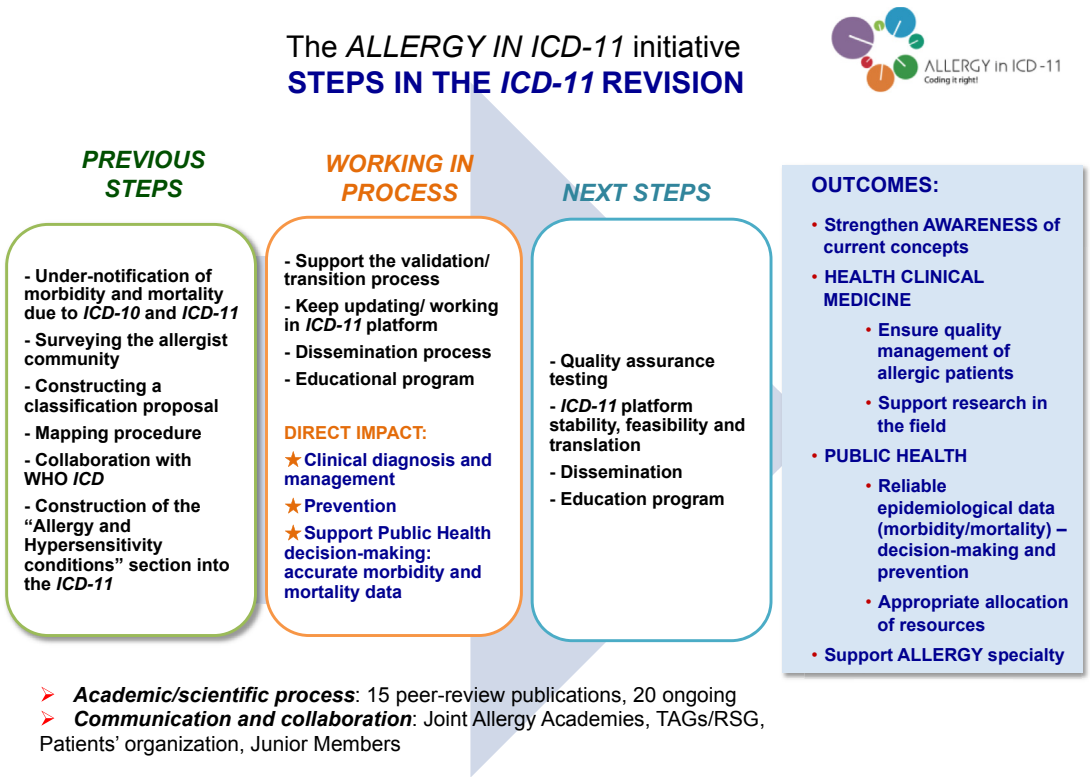

Figure 2. *Allergy in ICD-11* Initiative action plan and expected outcomes. ICD, *International Classification of Diseases;* WHO, World Health Organization.

Table 1
Differences in the Classification of the Main Allergic and Hypersensitivity Conditions in the *ICD-10-CM* and *ICD-11*

Main hypersensitivity disorders (according to the *EAACI-WAO Revised Nomenclature*)	*ICD-10-CM* Corresponding chapter(s)	*ICD-11* Beta draft allergic and hypersensitivity conditions section
Asthma	Chapter 10: Diseases of the Respiratory System	Allergic or Hypersensitivity Disorders Involving the Respiratory Tract
Rhinitis	Chapter 10: Diseases of the Respiratory System	Allergic or Hypersensitivity Disorders Involving the Respiratory Tract
Conjunctivitis	Chapter 7: Diseases of the Eye and Adnexa	Allergic or Hypersensitivity Disorders Involving the Eye
Skin diseases		
Dermatitis	Chapter 12: Diseases of the Skin and Subcutaneous Tissue	Allergic or Hypersensitivity Disorders Involving Skin and Mucous Membranes
Urticaria	Chapter 12: Diseases of the Skin and Subcutaneous Tissue	
Angioedema	Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes Chapter 3: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	
Food hypersensitivity	Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes Chapter 12: Diseases of the skin and subcutaneous tissue Chapter 11: Diseases of the digestive system Chapter 21: Factors influencing health status and contact with health services	Food Hypersensitivity section in the Complex Allergic or Hypersensitivity Conditions
Drug hypersensitivity	Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes Chapter 20: External Causes of morbidity and mortality Chapter 12: Diseases of the skin and subcutaneous tissue Chapter 21: Factors influencing health status and contact with health services	Drug Hypersensitivity section in the Complex Allergic or Hypersensitivity Conditions
Venom hypersensitivity	Chapter 20: External Causes of Morbidity and Mortality	Allergic or Hypersensitivity Reactions to Arthropods section in the Complex Allergic or Hypersensitivity Conditions
Anaphylaxis	Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes T78 Adverse effects, not elsewhere classified T98.0 Anaphylactic reaction due to food T78.1 Other adverse food reactions, not elsewhere classified T78.2 Anaphylactic shock, unspecified T78.3 Angioneurotic edema T78.4 Other and unspecified allergy	Anaphylaxis section subheadings: Drug-induced anaphylaxis Anaphylaxis due to insect venom Anaphylaxis provoked by physical factors Anaphylaxis due to inhaled allergens Anaphylaxis due to contact with allergens Anaphylaxis secondary to mast cell disorders

Abbreviations: EAACI, European Academy of Allergy and Clinical Immunology; *ICD-10-CM*, *International Classification of Diseases, Clinical Modification*; *ICD-11*, *International Classification of Diseases, 11th Revision*; WAO, World Allergy Organization.

for the need for changes.[4–18] The *Allergy in ICD-11* Initiative has been moving efforts during the last 4 years toward this end and has received unwavering support from an international collaboration of allergy academies, composed of the American Academy of Allergy Asthma and Immunology, the European Academy of Allergy and Clinical Immunology, the World Allergy Organization, the American College of Allergy Asthma and Immunology, the Asia Pacific Association of Allergy, Asthma and Clinical Immunology, and the Latin American Society of Allergy, Asthma and Immunology. The continuing close collaboration between our group and the WHO has the backing of the Joint Allergy Academies and has as a major achievement of this process the construction of an Allergic and Hypersensitivity Conditions parented subchapter under the Disorders of the Immune System chapter.[11,19] Allergic and hypersensitivity disorders are managed not only by allergists but also by specialists from a range of different disciplines. As a consequence, intensive scientific and technical discussions with *ICD* Topic Advisory Groups and Expert Working Groups were essential for achieving consensus for the new classification, which will for the first time enable allergic and hypersensitivity reactions to be properly represented within the *ICD*. During this process, we also have been in contact with junior members and fellow-in-training groups of the above academies and patient organizations.

Although the *ICD-11* is still quite some time away from being officially ready for use, from the WHO perspective, the *ICD-11* is the top priority. Considering the new classification model addressed to the allergic and hypersensitivity conditions, to follow the WHO *ICD* revision agenda and support our US colleagues, we believe it is the appropriate time to start the discussions regarding the possible influence and outcomes of *ICD-11* transition on clinical practice taking the US perspective, whenever it will occur.

Effect of the New Allergic and Hypersensitivity Conditions Section in the *ICD-11*

Clinical Practice of the US Allergists: Diagnosis and Management of Allergic Patients

Allergies, including allergic asthma and allergic rhinitis, affect an estimated 40 million to 50 million people in the United States. Some allergies may interfere with day-to-day activities or lessen the quality of life.[20] In fact, allergies and hypersensitivity disorders are multifaceted conditions that can manifest at any age and any health care professional may be faced with them.

Even though many efforts have been made by US allergy specialty societies to update allergies into the *ICD-10-CM*,[21] we still face some misclassification, such as for anaphylaxis, because its

Table 2
Asthma Classification from the *ICD-10-CM and ICD-11* Perspectives

ICD-10-CM Corresponding chapter(s)	*ICD-11* Beta draft	
	Allergic and hypersensitivity conditions section (allergic or hypersensitivity disorders involving the respiratory tract)	Extension codes chapter
J45 Asthma	Asthma	Severity scale
Allergic (predominantly) asthma	Allergic asthma	Mild
Allergic bronchitis not otherwise specific	Allergic asthma with exacerbation	Moderate
Allergic rhinitis with asthma	Allergic asthma with status asthmaticus	Severe
Atopic asthma	Allergic asthma, uncomplicated	Temporality
Extrinsic allergic asthma	Nonallergic asthma	Intermittent
Hay fever with asthma	Nonallergic asthma with exacerbation	Persistent
Idiosyncratic asthma	Nonallergic asthma with status asthmaticus	Cause
Intrinsic nonallergic asthma	Nonallergic asthma, uncomplicated	Allergens
Nonallergic asthma	Other specified forms of asthma or bronchospasm	Causality
J45.2 Mild intermittent asthma	Aspirin-induced asthma	Occupational
J45.20 Mild intermittent asthma, uncomplicated (including mild intermittent asthma not otherwise specified)	Exercise-induced bronchospasm	Infectious agents
J45.21 Mild intermittent asthma with (acute) exacerbation	Cough variant asthma	Substances
J45.22 Mild intermittent asthma with status asthmaticus	Asthmatic pulmonary eosinophilia	Chemical
J45.3 Mild persistent asthma	Samter syndrome	Medicaments
J45.30 Mild persistent asthma, uncomplicated (including mild persistent asthma not otherwise specified)	Drug-induced bronchospasm	Response to treatment or management procedures (remains implementation)
J45.31 Mild persistent asthma with (acute) exacerbation	Bronchospasm provoked by allergy to food substance	Controlled
J45.32 Mild persistent asthma with status asthmaticus	Unspecified asthma	Uncontrolled
J45.4 Moderate persistent asthma	Unspecified asthma with exacerbation	Refractory
J45.40 Moderate persistent asthma, uncomplicated (including moderate persistent asthma not otherwise specified)	Unspecified asthma with status asthmaticus	Partial remission
J45.41 Moderate persistent asthma with (acute) exacerbation	Unspecified asthma, uncomplicated	Complete remission
J45.42 Moderate persistent asthma with status asthmaticus		
J45.5 Severe persistent asthma		
J45.50 Severe persistent asthma, uncomplicated (including severe persistent asthma not otherwise specified)		
J45.41 Severe persistent asthma with (acute) exacerbation		
J45.42 Severe persistent asthma with status asthmaticus		
J45.9 Other and unspecified asthma		
J45.9 Other and unspecified asthma		
J45.90 Unspecified asthma		
J45.99 Other asthma		

Abbreviations: *ICD-10-CM*, *International Classification of Diseases, Clinical Modification*; *ICD-11*, *International Classification of Diseases, 11th Revision*.

frame has inherited a structure from previous versions of *ICD* in which topographic distribution frequently takes precedence (Table 1). By consolidating all allergic conditions into one *ICD-11* single section, as opposed to spreading them out over many *ICD-10* (and *ICD-10-CM*) chapters (Table 1) and by allowing all the relevant codes to be used to represent specific conditions, our aim was to facilitate the use of such classification and codes by clinicians, epidemiologists, and statisticians, as well as all data custodians and other relevant personnel. In other words, aligning the clinical diagnosis to *ICD* classification and codes provides a realistic recognition of allergic conditions and allows a better management of allergic patients.

As an example, conceptually, asthma is a clinical syndrome characterized by recurrent attacks of breathlessness and wheezing or cough, which varies in severity and frequency from person to person. In an individual, these events may occur from hour to hour and day to day. Although covering a heterogeneous group of phenotypes and endotypes, it is often the result of inflammation of the air passages in the lungs and affects the sensitivity of the nerve endings in the airways so they become easily irritated. In *ICD-10-CM*, asthma (J45) includes allergic (predominantly) asthma, allergic rhinitis with asthma, hay fever with asthma, and nonallergic asthma. The severity classification of asthma is prioritized (Table 2). Different from the previous *ICD* editions, the *ICD-11* revision allows a multihierarchical structure in which underlying mechanisms can be considered. Unifying allergic and hypersensitivity conditions under a specific section in the building block of the Allergic or Hypersensitivity Conditions Involving the Respiratory Tract section has allowed for *allergic asthma* and *nonallergic asthma* to be highlighted as main stem terms of the asthma subsection. The rationale for this semantic move was related to clinical practice. In general, the severity classification is used to support the management of patients with asthma by adapting drugs and drug doses. In order to reach an appropriate management, physicians reclassify the asthma control in the follow-up.[22,23] However, considering mechanisms in the stem terms, it is possible to reach higher specification in diagnosis and facilitate the possible treatment and management procedures more appropriately. Having a specific code for *allergic asthma* enables specific diagnostic procedures and treatment, such as immunotherapy[12] (eg, the allergen immunotherapy or the anti-IgE omalizumab), can be covered by third-party payers, which will then benefit patients, physicians, and public

health. On the other hand, neither severity nor temporal characterization will be lost because these additional classifications will be able to be combined to the stem terms, what is called postcoordination from the WHO *ICD* perspective. The supplementary specification (severity, temporal nature, origin, and response to treatment) will be scattered into the *ICD-11* Extension Codes chapter (Table 2). Finer distinctions in the medical data offer a more precise evaluation and management of patients.

Clinical Vignette: Application of ICD-10-CM and ICD-11

A nonatopic, 60-year-old man, with no known drug allergies, investigated a possible abdominal tumor. After 5 minutes of the infusion of a low-osmolar intravenous contrast media for an abdominal computed tomography, he began with shortness of breath, generalized flushing with pruritus, bronchospasm, chest pain, and nausea. The serum tryptase level at 25 minutes was 8.5 μg/L (basal tryptase level, 9 μg/L). After treatment and recovery, he underwent allergologic workup. Investigation results were negative for latex allergy but positive for contrast media. Final diagnosis would be anaphylaxis grade III for acute phase, drug-induced anaphylaxis for clinical diagnosis, and contrast media for origin. From the *ICD-10-CM* perspective, it would be classified as *anaphylactic shock* (prioritizing just severe cases) (T78.2), *anaphylactic reaction due to adverse effect of correct drug or medicament properly administered* (nonbillable) (T88.6), and *radiographic dye allergy status* (Z91.041). Although the corresponding *ICD-11* codes are not completely defined, applying the *ICD-11* logic, the case would be classified as *anaphylaxis heading* + *grading scale*, drug-induced anaphylaxis (4E41), and iodinated contrast medium (XJ47.4H).

Looking to the Future

Although aware that the *ICD-10-CM* has only been recently launched in the United States, starting the discussion and designing actions together with both American allergy specialty societies to try to avoid the same problems faced in 2008 is necessary. Efforts to support the *ICD-10* (and adaptations) transition to *ICD-11* aim to ensure the global acceptance of the *ICD-11* new frame model worldwide. As a first technical attempt with this aim, we found that overall 87% of *ICD-10-CM* terms could be captured in the *ICD-11* beta draft framework, underlying stability and meaningful location in the new framework.[17] Most of the terms that did not reach correspondence in the *ICD-11* framework were attributable to updates in the classification as expected in the revision processes, with the assurance of having 100% concordance eventually.

Overall, the WHO indicates that the *ICD* is currently responsible for allocating approximately 70% of the world's health expenditures, meaning US$2.3 trillion in 2013 and US$2.6 trillion in 2014 according to the National Center for Health Statistics.[2] Therefore, every modification into the *ICD* framework may have a potential effect in health finance and economy. Greater specificity regarding clinical conditions and services delivered will provide payers, policymakers, and practitioners with better information to make major refinements to US payment and reimbursement systems, including the design and implementation of pay-for-performance program.

Many quality measures, such as those from US HealthGrades and the Agency for Healthcare Research and Quality, rely on the WHO *ICD* codes. Increasing the specification of conditions will help clarify the connection between a practitioner's performance and the patient's condition. Accurate and updated diagnostic and procedure codes will improve data on the outcomes, efficacy, and costs of new medical technology and facilitate fair reimbursement policies for the use of this system. It will help payers and practitioners more easily identify patients in need of disease management and more effectively tailor disease management programs.

From the public health perspective, by allowing all the relevant diagnostic terms for allergic and hypersensitivity conditions to be included in the *ICD-11*, the WHO has recognized their importance not only to clinicians but also to epidemiologists, statisticians, health care planners, and other stakeholders. Importantly, the new classification will enable the collection of more accurate epidemiologic data to support quality management of patients with allergies and better facilitate health care planning and decision making and public health measures to prevent and reduce the morbidity and mortality attributable to allergic diseases. The improved logic and standardized definitions through the *ICD-11* will also facilitate international comparisons of quality care and the sharing of best practice globally.

Different from the previous versions of the *ICD* (and adaptations), the *ICD-11* logic will enable more flexibility in the classification process. It will prioritize postcoordination, allowing the incorporation of more detailed classifications to the stem term. The additional classifications, such as topography, severity, and chronologic scale, are now available in the Extension Codes chapter (eg, *severe persistent asthma* [J45.5] of *ICD-10-CM* = *asthma* [*DA62*] + *severe* [XA03] + *persistent* [XA50.6]). Although seemingly more complex, the rationale of this new logic is increasing classification and coding accuracy and giving flexibility for the classification procedure by making it easier and faster by focusing first on the disease itself and then on its additional characteristics. The *ICD-11* aims to support the end users to follow the evolution of the patient; the stable disorder represented by the stem code will be preserved (eg, asthma [DA62]), and the additional classification can be changed according to the clinical follow-up. A period of adaptation to the new codes and new philosophy of the *ICD-11* is expected as in all *ICD* transitions. However, to smooth the possible difficulties and doubts, the core *Allergy in ICD-11* operational team (L.K.T., M.C., P.D.) in collaboration with national allergy academies and the WHO intends to implement educational tools to prepare the allergy community before the *ICD-11* is released. Educational and research efforts will also help to address the current morbidity and mortality underrecognition of allergic and hypersensitivity conditions by patients, caregivers, and health care professionals.

We strongly believe that the outcomes of all past and future actions will positively affect epidemiologic data, improve the quality of care provided by health care professionals in clinical practice, and support recognition of the allergy specialty worldwide.

Acknowledgments

We are extremely grateful to all the representatives of the *ICD-11* revision with whom we have been carrying on fruitful discussions, helping us to fine-tune the classification presented in this article: Robert Jakob, Linda Best, Nenad Kostanjsek, Robert J. G. Chalmers, Jeffrey Linzer, Linda Edwards, Ségolène Ayme, Bertrand Bellet, Rodney Franklin, Matthew Helbert, August Colenbrander, Satoshi Kashii, Paulo E. C. Dantas, Christine Graham, Ashley Behrens, Julie Rust, Megan Cumerlato, Tsutomu Suzuki, Mitsuko Kondo, Hajime Takizawa, Nobuoki Kohno, Soichiro Miura, Nan Tajima, and Toshio Ogawa.

References

[1] Moriyama IM, Loy RM, Robb-Smith AHT, Rosenberg HM, Hoyert DL, eds. *History of the Statistical Classification of Diseases and Causes of Death*. Hyattsville, MD: National Center for Health Statistics; 2011.
[2] World Health Organization website. http://www.who.int/classifications/icd/en/. Accessed August 1, 2016.
[3] Chute CG, Huff SM, Ferguson JA, Walker JM, Halamka JD. There are important reasons for delaying implementation of the new ICD-10 coding system. *Health Aff (Millwood)*. 2012;31:836–842.

[4] Tanno LK, Ganem F, Demoly P, Toscano CM, Bierrenbach AL. Undernotification of anaphylaxis deaths in Brazil due to difficult coding under the ICD-10. *Allergy*. 2012;67:783–789.
[5] Tanno LK, Calderon MA, Goldberg BJ, Akdis CA, Papadopoulos NG, Demoly P. Categorization of allergic disorders in the new World Health Organization International Classification of Diseases. *Clin Transl Allergy*. 2014;4:42.
[6] Demoly P, Tanno LK, Akdis CA, et al. Global classification and coding of hypersensitivity diseases: an EAACI-WAO survey, strategic paper and review. *Allergy*. 2014;69:559–570.
[7] Tanno LK, Calderon MA, Goldberg BJ, et al. Constructing a classification of hypersensitivity/allergic diseases for ICD-11 by crowdsourcing the allergist community. *Allergy*. 2015;70:609–615.
[8] Tanno LK, Calderon MA, Papadopoulos NG, Demoly P; EAACI/WAO Task Force of a Global Classification of Hypersensitivity/Allergic diseases. Mapping hypersensitivity/allergic diseases in the International Classification of Diseases (ICD)-11: cross-linking terms and unmet needs. *Clin Transl Allergy*. 2015;5:20.
[9] Tanno LK, Calderon MA, Demoly P; Joint Allergy Academies. Making allergic and hypersensitivity conditions visible in the International Classification of Diseases-11. *Asian Pac Allergy*. 2015;5:193–196.
[10] Tanno LK, Calderon MA, Demoly P. on behalf the Joint Allergy Academies. Optimization and simplification of the allergic and hypersensitivity conditions classification for the ICD-11. *Allergy*. 2016;71:671–676.
[11] Tanno LK, Calderon MA, Demoly P; Joint Allergy Academies. New allergic and hypersensitivity conditions section in the International Classification of Diseases-11. *Allergy Asthma Immunol Res*. 2016;8:383–388.
[12] Tanno LK, Calderon MA, Papadopoulos NG, et al. Revisiting desensitization and allergen immunotherapy concepts for the International Classification of Diseases (ICD)-11. *J Allergy Clin Immunol Pract*. 2016;4:643–649.
[13] Tanno LK, Calderon MA, Li J, Casale T, Demoly P. Updating allergy/hypersensitivity diagnostic procedures in the WHO ICD-11 revision. *J Allergy Clin Immunol Pract*. 2016;4:650–657.
[14] Tanno LK, Calderon MA, Papadopoulos NG, et al; Joint Allergy Academies. Surveying the new allergic and hypersensitivity conditions chapter of the International classification of diseases (ICD)-11. *Allergy*. 2016;71:1235–1240.
[15] Tanno LK, Calderon M, Demoly P; Joint Allergy Academies. Supporting the validation of the new allergic and hypersensitivity conditions section of the World Health Organization International Classification of Diseases-11. *Asia Pac Allergy*. 2016;6:149–156.
[16] Tanno LK, Bierrenbach AL, Calderon MA, Sheikh A, Simons FE, Demoly P; Joint Allergy Academies. Decreasing the undernotification of anaphylaxis deaths in Brazil through the International Classification of Diseases (ICD)-11 revision [published online August 18, 2016]. *Allergy*. http://dx.doi.org/10.1111/all.13006.
[17] Tanno LK, Calderon M, Sublett JL, Casale T, Demoly P. Joint Allergy Academies. Smoothing the transition from International Classification of Diseases, Tenth Revision, Clinical Modification to International Classification of Diseases, Eleventh Revision. *J Allergy Clin Immunol Pract*. 2016;4:1265–1267.
[18] Tanno LK, Calderon MA, Smith HE, Sanchez-Borges M, Sheikh A, Demoly P. Joint Allergy Academies. Dissemination of definitions and concepts of allergic and hypersensitivity conditions. *World Allergy Organ J*. 2016;9:24.
[19] World Health Organization, ICD-11 Beta Draft website. http://apps.who.int/classifications/icd11/browse/l-m/en#/accessed. Accessed August 1, 2016.
[20] American College of Allergy, Asthma and Immunology website. http://acaai.org/allergies/who-has-allergies. Accessed August 1, 2016.
[21] Centers for Disease Control and Prevention website. http://www.cdc.gov/nchs/icd/icd10cm.htm. Accessed January 1, 2016.
[22] Reddel HK, Bateman ED, Becker A, et al. A summary of the new GINA strategy: a roadmap to asthma control. *Eur Respir J*. 2015;46:622–639.
[23] Chung KF, Wenzel SE, Brozek JL, et al. International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma. *Eur Respir J*. 2014;43:343–373.