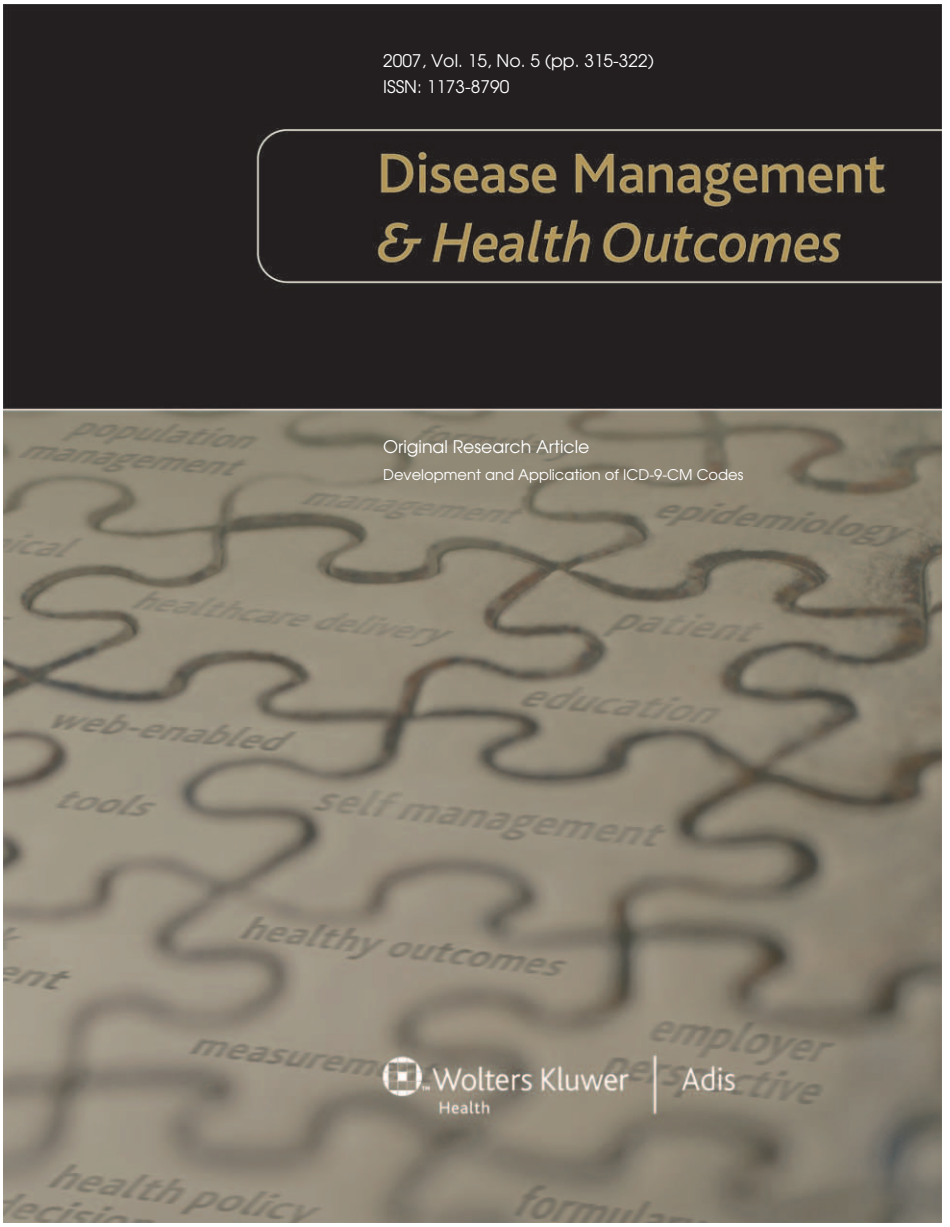

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Consensus Development and Application of ICD-9-CM Codes for Defining Chronic Illnesses and their Complications

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Abstract

Background: One particularly difficult challenge in evaluating disease management (DM) programs is defining the scope of economic outcomes to include in the evaluation. Measuring 'all-cause utilization' or 'total costs' assumes that a DM intervention impacts the entire spectrum of services rendered and reduces total medical costs, while limiting the evaluation to 'disease-specific' costs of the conditions under management may fail to capture any effect the program may have on complications directly related to that primary condition. An acceptable compromise between the two options is to include costs associated with diagnostic codes for the primary condition and those of medical complications directly related to that condition.

Objective: To develop consensus on the International Classification of Diseases, ninth revision, Clinical Modification (ICD-9-CM) codes defining the primary conditions and complications of coronary artery disease (CAD), congestive heart failure (CHF), asthma, and chronic obstructive pulmonary disease.

Methods: A modified Delphi technique, involving two panels of three physicians each (one consisting of cardiologists and the other of pulmonologists) and a physician consultant, was conducted via email and used to establish 100% consensus on the ICD-9-CM codes to be included in order to capture the appropriate costs for each of the primary conditions considered and their complications. The codes for primary conditions included by the panel were compared with those included in industry references.

Results: Total consensus on the codes to be included for each of the primary conditions was reached within three rounds. Near-consensus on the codes to be used for complications for conditions was reached after the first round; however, four additional rounds were required for total consensus. Regarding the primary conditions, greatest agreement between the codes included by the panel and the various industry references was seen for asthma, with poor agreement observed between sources of codes for CAD and CHF.

Conclusion: It is suggested that these lists of ICD-9-CM codes developed by consensus be used in evaluations across the industry to define the utilization and/or costs associated with DM interventions. The consistent use of these codes will greatly strengthen the validity of the current evaluation approach and consequently substantiate the value proposition offered by the industry.

One particularly difficult challenge in evaluating the effectiveness of disease management (DM) programs is defining the scope of economic outcomes to include in the evaluation. Measuring all health services used by a participant, or including the total costs of those services, assumes that a DM intervention impacts the entire spectrum of services rendered and reduces total medical costs. This reasoning has no face validity for DM interventions that focus on a participant's specific chronic disease and thus cannot be

assumed to impact conditions or services completely unrelated to that condition. For example, it is unreasonable to assume that a DM intervention targeting congestive heart failure would have a causal impact on utilization or costs associated with automobile accidents. When 'all-cause' utilization is included in the evaluation of program effectiveness, any decrease in costs due to fewer accidents could be wrongfully attributed to the program.

Limiting an evaluation to costs associated with the specific conditions under management or to only those acute services that are reasonably impacted by the intervention will eliminate this bias.[1] However, in doing so, it will also fail to capture any effect the program has on medical complications directly related to that primary condition. This would systematically underestimate the cost savings achieved by the program. Therefore, an acceptable compromise between the two options is to include costs associated with diagnostic codes for the primary condition under management plus those associated with diagnostic codes for medical complications directly related to that condition. In using this approach, a realistic approximation of the program effect on medical costs and utilization can be estimated.

At present, DM program evaluations do not use a consistent set of diagnostic codes for establishing primary chronic conditions, nor do they define or account for associated complications. Thus, patients may be differentially identified across periods, settings, or interventions, limiting the validity of comparisons of outcomes between programs. A search of the peer-reviewed literature in Medline and a review of disease associations/trade group websites did not uncover any references or lists for complications of chronic diseases. Therefore, the current study had two objectives: (i) to develop consolidated lists of the International Classification of Diseases, ninth revision, Clinical Modification (ICD-9-CM) codes associated with the diagnosis of four major chronic illnesses (coronary artery disease [CAD], congestive heart failure [CHF], asthma, and chronic obstructive pulmonary disease [COPD]); and (ii) to develop lists of the ICD-9-CM codes for the complications of these four major chronic conditions. In this paper, the term 'complication' refers to any diagnosis physiologically related to the primary chronic condition. This term is not synonymous with comorbidity, which is defined as a 'concomitant but unrelated pathologic disease process'.[2]

We suggest that the lists presented in this article be used to define resource utilization and/or costs included in the evaluation of DM interventions across the industry. The consistent use of these codes will strengthen the validity of the current evaluation approach and consequently substantiate the value proposition offered by the industry.

Methods

The most comprehensive strategy to identify the diagnosis codes for specific chronic conditions and their complications is to conduct a thorough assessment of the scientific literature. However, this process requires substantial resources and is limited by the incomplete evidence base. A viable alternative is consensus development via Delphi panel, Nominal Group, and other hybrid methods,[3] which relies on expert opinion and discussion to reach agreement. These methods can achieve results more efficiently and serve as a substitute until near complete evidence is available.

The standard Delphi method typically involves administering questionnaires to individual participants, tabulating the results, and resubmitting the report to the panel over a series of three or four rounds in an effort to achieve consensus. A Delphi is considered complete when there is a convergence of opinion or when a point of diminishing returns is reached.[3] Limitations of the standard method include the requirement for a large number of participants at a typically high cost over a considerable period of time, the fatigue factor that sets in with panelists after two or three rounds, and the logistics of administering the project to ensure accuracy and completeness.

The current study addresses the recommendations made by Fink et al.,[3] which are:

- focus on a carefully defined problem that can be investigated in a timely and economical way;
- consensus panel participants should qualify for selection because they are representative of their profession;
- decisions on important issues should be justified by available empirically derived data as well as by judgments and experience;
- the level or type of consensus must be defined in advance;
- objective and skilled leaders should administer the consensus process;
- consensus findings should represent clear and specific guides to action.

First, the impetus for assembling this panel was to focus on a carefully defined problem that can be investigated in a timely and economical way. There is currently no single set of ICD-9-CM codes that is consistently used in the DM industry for defining primary chronic disease, and no list of complications of these chronic illnesses. Additionally, this process was conducted entirely via email exchange, allowing for sufficient discussion to be had for each issue raised until consensus was achieved in a timely and economical way. Second, panelists who participated in the consensus process are specialists in the given areas, with extensive experience, who hold medical school faculty positions that reflect this. Third, decisions to include or exclude specific codes were

supported by evidence-based medicine (see the next section). Fourth, the level and type of consensus was defined in advance. More specifically, we were intent on achieving 100% agreement among panelists for including or excluding each individual ICD-9-CM code represented in the tables. Fifth, the primary researcher on this project (A Linden) is an extensively published and experienced health services researcher, but is not a medical doctor. This ensured that the process was administered in an objective manner consistent with research practices. Given the complexity of the clinical issues involved, a physician consultant (TJ Buiso) served as the conduit between the panel and study director on issues that required clinical expertise. This approach further ensured integrity and objectivity of the process. Finally, the lists of ICD-9-CM codes for primary conditions and complications represent a clear and specific guide to action.

Modified Delphi Panel

Consensus Panels

Two distinct groups of panelists were assembled for this project, and comprised three cardiologists and three pulmonologists. The choice to limit each panel to three physicians was based on the first recommendation by Fink et al.[3] to ensure that the process would be completed in a timely and economical fashion. No funding was provided for this study and the importance of the topic area precluded expanding the panel beyond the current scope. An odd number of physicians (three per panel) were to ensure that majority agreement could be achieved if consensus was not reached.

The six physician specialists were referred to the study director (A Linden) by the medical director of the Oregon Health and Science University (OHSU) Medical Group. Criteria for inclusion were that the physicians must (i) have extensive experience in the given specialty area, (ii) serve as faculty at the OHSU medical school, and (iii) have experience in clinical research. The physician panelists have practiced medicine for an average of 24 years (range 11–31 years).

A seventh physician specialist (TJ Buiso), a US expert in the area of metabolic syndrome, served as a consultant on the project to facilitate discussion when consensus was not immediately reached, and to identify clinical issues that may require further discussion amongst panelists. In those instances, the consultant would pose the question to the panel and all responses were shared with the group. The consultant was also tasked with providing empirically-derived data to drive and support the discussion.

All of the panelists voluntarily agreed to participate in developing tables of primary disease codes and complications within their area of expertise. Three cardiologists participated in the development of the CAD- and CHF-related codes, and three pulmonologists developed the lists for asthma and COPD. At the outset of the project, each panelist received an explanation of the study methodology along with a description of the tasks they were required to perform. All communication was conducted via email to ensure that the process would be completed in a timely fashion, while concomitantly limiting the burden placed on the panelists. In the initial round of the project, each panelist operated independently of the others and all list reports were then collated to ensure anonymity. The subsequent rounds, which required group discussion, were conducted via email sessions that included all participants. In instances where no response was provided by a given panelist, the study director personally followed up with that physician.

Primary Diagnosis Code Generation

Primary diagnosis codes for each chronic condition were taken from industry reference sources and compiled into consolidated tables for review by the panelists. The reference sources were those most commonly used in the industry at the current time and include lists from the Disease Management Association of America (DMAA),[4] the CMS Physician Quality Reporting Initiative (PQRI),[5] the Health Plan Employer Data and Information Set (HEDIS®),[6] and CMS Quality Assurance and Process Improvement (QAPI).[7] While the DMAA and PQRI include codes for all four conditions, HEDIS® offers codes only for CAD and asthma, and QAPI provides codes only for CHF.

Complication Code Generation

Each physician was instructed to independently review the 2007 ICD-9-CM code book to create general diagnosis categories for the complications for their assigned primary chronic conditions, and then find all specific diagnoses codes that fell under those underlying categories. Each panelist provided their lists of complications to the study director for compilation. The physician consultant reviewed the consolidated lists to (i) ensure consistency in the application of codes to each category; (ii) identify diagnoses that required clarification as to their inclusion or exclusion; and (iii) suggest additional codes appropriate to the given condition.

Consensus Development

The newly compiled lists of ICD-9-CM codes for primary diagnoses and complications were returned to individual panelists for review and comment. All codes that were not identified by all participants were highlighted and participants were individually asked to either accept or reject them. Next, all codes that did not receive 100% agreement on their inclusion/exclusion were discussed by the panelists via email until agreement was reached. Some codes required discussion as to whether they should be included as a primary condition or a complication. After consensus

was achieved, the physician consultant reviewed and finalized all tables.

Results

Primary Diagnosis Codes

Table I presents the enhanced ICD-9-CM codes determined by our consensus panel to define the four primary chronic conditions. Total consensus was reached by the panelists on these codes within three rounds. There was tremendous variability between sources regarding the codes included for some conditions, while greater agreement was observed for other conditions. As shown in table II, the highest level of concordance between sources was found for asthma, where all four applicable sources (PQRI, HEDIS®, DMAA, and consensus panel) agreed on 73.3% of the codes. At the other extreme, the sources agreed on only 9.1% of codes for defining CAD. The discordance regarding the codes for CAD among the applicable sources (PQRI, HEDIS®, DMAA, and consensus panel) can generally be explained by the use of codes 423 (other pericardial disease) and 427 (cardiac dysrhythmias) by the DMAA, and the introduction of the higher series codes (433, 434, 440, 444, and 445) for defining ischemic vascular disease (a somewhat broader scope than CAD alone) by HEDIS®. Codes for CHF also displayed poor agreement between sources (36.2% of codes were in all four applicable sources [PQRI, QAPI, DMAA, and consensus panel]). This discordance is primarily due to the consensus panel's inclusion of codes 422 (acute myocarditis), 425 (cardiomyopathy), and 429 (ill-defined heart disease). The panel determined that these codes should be included given that they represent CHF of non-ischemic origin. COPD achieved 50% concordance among the three applicable sources (PQRI, DMAA, and consensus panel). This discordance is due to DMAA's inclusion of codes 493 (asthma) while concomitantly excluding 496.00 (chronic airway obstruction).

Complication Codes

Enhanced ICD-9-CM codes used to define complications of CAD, CHF, asthma, and COPD are presented in tables III, IV, V, and VI, respectively. Near unanimity was reached after the first round of review. However 100% consensus was achieved only after substantial discussion (four additional rounds). The following are a few examples of discussion points based on the chronic condition.

Coronary Artery Disease and Congestive Heart Failure

- Renal artery atherosclerosis: while an embolic event affecting the renal artery may be a complication of CAD, the presence of renal artery atherosclerosis is not a complication of either CHF or CAD. Nonetheless, the presence of renal artery disease may complicate the management of patients with heart failure, given the potential for adverse effects in patients with renal artery disease who are receiving ACE inhibitors. Decision: exclude as complication of CAD and include as complication of CHF.
- Long QT syndrome (acquired): the current literature suggests an association of the length of the QT interval with the degree of coronary disease, CHF, and the occurrence of long QT arrhythmias while receiving anti-arrhythmics in these patient populations. Long QT syndrome has several etiologies: congenital, drug induced, secondary to electrolyte imbalances and arrhythmias associated with such disorders, and is also associated with CAD and dilated cardiomyopathy. Decision: include as complication of CAD.

Asthma and Chronic Obstructive Pulmonary Disease

- Hypersensitivity pneumonitis: hypersensitivity pneumonitis may present with asthma but has a distinct pathophysiologic pathway. Decision: exclude as complication of asthma.

Table I. Enhanced International Classification of Diseases, ninth revision, Clinical Modification (ICD-9 CM) codes determined by consensus panels for defining selected primary chronic conditions

Coronary artery disease	Congestive heart failure	Asthma	Chronic obstructive pulmonary disease
410.00, 410.01, 410.02, 410.10, 410.11, 410.12, 410.20, 410.21, 410.22, 410.30, 410.31, 410.32, 410.40, 410.41, 410.42, 410.50, 410.51, 410.52, 410.60, 410.61, 410.62, 410.70, 410.71, 410.72, 410.80, 410.81, 410.82, 410.90, 410.91, 410.92, 411.00, 411.10, 411.81, 411.89, 412.00, 413.00, 413.10, 413.90, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.80, 414.90	398.90, 398.91, 398.99, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 422.00, 422.90, 422.91, 422.92, 422.93, 422.99, 425.00, 425.10, 425.20, 425.30, 425.40, 425.50, 425.70, 425.80, 425.90, 428.00, 428.10, 428.20, 428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, 428.90, 429.00, 429.10, 429.20, 429.30, 429.40, 429.50, 429.60, 429.70, 429.71, 429.79, 429.80, 429.81, 429.83, 429.89, 429.90, 674.50	493.00, 493.01, 493.02, 493.10, 493.11, 493.12, 493.20, 493.21, 493.22, 493.80, 493.81, 493.82, 493.90, 493.91, 493.92	491.00, 491.10, 491.20, 491.21, 491.22, 491.80, 491.90, 492.00, 492.80, 496.00, 506.30

Table II. Concordance amongst references in choosing International Classification of Diseases, ninth revision, Clinical Modification (ICD-9-CM) codes for defining primary diagnoses

Parameter	CAD	CHF	Asthma	COPD
References with codes	4	4	4	3
Total codes used	110	58	15	14
Four-way agreement (% codes)	9.1	36.2	73.3	n/a
Three-way agreement (% codes)	34.5	5.2	20.0	50.0
Two-way agreement (% codes)	0.9	1.7	6.7	21.4
Codes with single reference (% codes)	55.5	56.9	0.0	28.6

CAD = coronary artery disease; **CHF** = congestive heart failure; **COPD** = chronic obstructive pulmonary disease.

- Pneumonia, influenza, sinusitis, and polyps: while these diagnoses are associated with asthma, they do not represent complications of the disease. Decision: exclude as complication of asthma.
- Polycythemia as an effect of chronic hypoxemia: increased red cell production as a secondary effect of hypoxemia is not uncommon in many patients with COPD. Decision: include as complication of COPD.
- Dysphonia: altered speech, but not hoarseness, may be associated with COPD therapy (e.g. as adverse reaction from the use of inhalers). Decision: include as complication of COPD.
- Anemia: 'anemia of chronic disease' may be present with any disease. Decision: exclude as chronic complication of COPD.
- Cardiac tamponade from tension pneumothorax: the primary complications of severe emphysema may include tension pneumothorax, but not cardiac tamponade. Decision: exclude as complication of COPD and asthma.
- Increased sputum related to chronic bronchitis: COPD is defined as a chronic cough or chronic sputum production over 3 months for 2 consecutive years. Decision: exclude as complication of COPD.
- Acute exacerbation of chronic bronchitis: acute exacerbation of chronic bronchitis is a complication of COPD and often necessitates hospitalization. Decision: include as complication of COPD.
- Mycetoma and aspergillosis as pulmonary complications of lung disease: patients with asthma and COPD may need long-term glucocorticoid treatment and are therefore immunosuppressed and at risk for mycetoma and aspergillosis. Decision: include as complication of COPD and asthma.

Discussion

Establishing a consensus on the primary diagnosis codes for chronic illnesses and their complications is critical to improving DM evaluation. The two other approaches that are currently in use (including all costs or including only disease-specific costs with little agreement on what those are), may either over- or underestimate the impact of the program. For example, the American

Table III. Complications of coronary artery disease

Category of complication	Enhanced ICD-9-CM codes
Heart and great vessel disorders	414.10, 414.11, 429.00, 429.10, 429.20, 429.30, 429.50, 429.60, 429.79, 429.81, 441.01
Pulmonary disorders	416.90
Rhythm disorders	426.00, 426.10, 426.20, 426.30, 426.40, 426.50, 426.60, 426.90, 427.00, 427.10, 427.20, 427.30, 427.40, 427.50, 427.60, 427.80, 427.90
Myocardial disorders	428.10, 428.20, 428.30, 428.40, 428.90, 785.51
Valvular heart disorders	424.00, 424.10, 424.20
Pericardial disorders	411.00
Circulatory system disorders	444.00, 444.20, 444.21, 444.22, 444.80, 444.81, 444.89, 445.00, 445.01, 445.02 445.80, 445.81, 445.89, 451.10, 451.11, 451.19, 453.40
CNS disorders	433.00, 434.10, 435.00
Signs and symptoms	780.20, 780.70, 785.10, 790.95, 794.31, 786.00, 786.01, 786.02, 786.03, 786.04, 786.05, 786.06, 786.07, 786.09, 786.50, 786.51, 786.52, 786.59
Procedures and complications	414.12, 996.03, 996.72, V45.81, V45.82

ICD-9-CM = International Classification of Diseases, ninth revision, Clinical Modification.

Table IV. Complications of congestive heart failure

Category of complication	Enhanced ICD-9-CM codes
Kidney disorders	584.90, 585.90
Rhythm disorders	426.00, 426.10, 426.20, 426.30, 426.40, 426.50, 426.60, 426.90, 427.00, 427.10, 427.20, 427.30, 427.40, 427.50, 427.60, 427.80, 427.90,
Pulmonary disorders	415.00, 415.10, 416.80, 416.90, 514.00
CNS disorders	434.10, 435.90, 780.00
Valvular heart disorders	394.00, 394.10, 394.20, 394.90, 424.00, 395.00, 395.10, 395.20 396.20, 396.80, 424.10 425.10, 747.22, 396.00, 397.00, 424.20, 397.10, 424.30
Circulatory system disorders	444.00, 444.20, 444.21, 444.22, 444.80, 444.81, 445.00, 445.01, 445.02 445.80, 445.81, 445.89, 451.10, 451.11, 453.40
Gastrointestinal tract disorders	570.00, 571.90
Signs and symptoms	276.60, 276.80, 276.90, 285.29, 285.90, 286.70, 414.10, 458.00, 518.40, 780.20, 780.40, 780.58, 782.30, 785.00, 785.10, 785.20 785.30, 785.90, 786.00, 786.02, 786.04, 786.05, 786.06, 786.07, 786.09, 786.50, 786.51, 786.52, 789.50, 790.95, 794.30, 794.31, 799.40

ICD-9-CM = International Classification of Diseases, ninth revision, Clinical Modification.

Diabetes Association (ADA) commissioned a study in 2003[8] (as a follow-up to an earlier study in 1998[9]) that estimated the direct medical and indirect productivity-related costs attributable to diabetes mellitus. An important finding from that analysis was that diabetes alone accounted for only 5% of total hospital days, complications of diabetes accounted for 32% of hospital days, and the remaining 63% of hospital days were for diagnoses entirely unrelated to diabetes. Furthermore, in a similar context, a recent study estimated the number of hospitalizations that a diabetes DM program would have to reduce in order to break even.[10] The results showed that, to cover fees alone, the program would have to reduce diabetes-only hospitalizations by 74%; hospitalizations for diabetes and related complications by 39%; or all hospitalizations for diabetes, complications, and diagnoses possibly associated with diabetes by 26%.

Taken together, the results of these two studies highlight an underlying tension in DM program evaluation: limiting the evaluation to only the primary chronic condition under management underestimates the true economic impact of the disease (only 5% of hospital days were diabetes specific), while making it extremely difficult for a DM program to deliver a positive return on investment (a 74% reduction in admissions would be required simply to break even). Conversely, including diagnoses in the analysis that are entirely unrelated to the primary chronic condition under management will likely overestimate the true economic burden (63% of bed-days were not related to diabetes), while appearing to set the bar quite low regarding the delivery of cost saving by a DM program (only a 26% reduction in admissions would be needed to break even). However, because the intervention would not target these hospitalizations, achieving even a small reduction in these admissions would be difficult and unlikely to be realized. Both

Table V. Complications of asthma

Category of complication	Enhanced ICD-9-CM codes
Infectious disorders	117.30, 117.40, 460.10, 480.90
Pulmonary disorders	276.30, 276.40, 506.40, 512.80, 518.00, 518.60, 518.81, 518.83, 518.84, 518.89, 790.91, 799.02
Otorhinolaryngology or allergic disorders	472.00, 477.90, 478.70
Symptoms and systemic disorders	276.51, 780.97, 782.50, 783.21, 785.00, 786.00, 786.04, 786.05, 786.06, 786.07, 786.10, 786.20, 786.50, 786.52
Cardiac disorders	416.80, 427.00
Drug-induced disorders	112.00, 251.80, 255.00, 276.00, 333.10, 359.40, 359.90, 365.00, 366.45, 533.00, 701.80, 733.09, 782.30, 782.70, 785.00, 790.20, 790.60, 997.91, 292.90
CNS disorders	327.01, 780.97, 784.00
Procedures and complications	V46.10, V46.20

ICD-9-CM = International Classification of Diseases, ninth revision, Clinical Modification.

Table VI. Complications of chronic obstructive pulmonary disease

Category of complications	Enhanced ICD-9-CM codes
Infectious disorders	117.30, 117.40, 466.00, 484.60, 486.00, 507.00
Symptoms and systemic complications	276.50, 276.51, 276.60, 780.97, 782.30, 782.50, 783.21, 785.00, 786.00, 786.01, 786.02, 786.04, 786.05, 786.06, 786.07, 786.09, 786.20, 786.30, 786.50, 786.52, 786.70, 799.40
Pulmonary disorders	162.90, 276.20, 276.30, 276.40, 492.00, 512.80, 518.10, 518.81, 518.82, 518.83, 518.84, 518.89, 790.91, 799.02, 807.00
Cardiovascular disorders	415.00, 415.10, 416.80, 416.90, 427.89, 451.11, 440.00, 440.20, 440.80
CNS disorders	780.01, 780.02, 780.09, 780.50, 780.97, 784.00
Gastrointestinal disorders	530.81, 533.00, 789.00
Drug-induced disorders	112.00, 251.80, 255.00, 257.20, 292.81, 292.85, 333.10, 359.40, 359.90, 365.00, 366.45, 701.80, 728.20, 733.09, 782.30, 782.70, 785.00, 790.20, 790.60, 997.91
Procedures and complications	V46.10, V46.20

ICD-9-CM = International Classification of Diseases, ninth revision, Clinical Modification.

scenarios have serious drawbacks and emphasize the value in evaluating DM program effectiveness using an agreed-upon set of primary diagnosis and complication codes. With tremendous variability between accepted industry references for the diagnostic codes used to determine the presence of a given chronic illness, and no attempt to define the associated complications, the industry is far from such a consensus. The consequence is that DM programs are not readily comparable, resulting in considerable controversy as to whether the programs are indeed effective in reducing healthcare costs. The results of this study are a first step towards remedying this situation.

Study Limitations

There are three primary limitations to this study. First, not all of the conditions commonly targeted by DM programs were included. Diabetes and its related complications were deliberately not studied by the panel because of the existing work by the ADA. However, a future consensus panel should review and update those codes as necessary, and additional panels should be formed to develop tables of primary codes and complications for other chronic conditions relevant to DM.

Second, the results of the study reflect the opinions of one set of experts that practice in a given geographic region and may not reflect a national consensus. However, until a national panel of experts can be convened, the current paper represents the best alternative and may serve as the industry standard. The process of defining the set of primary diagnosis and complication codes for common chronic illnesses should be considered dynamic, with lists reviewed and updated as new evidence becomes available. The industry would benefit enormously from a cooperative effort to do so.

Third, each panel consisted of only three experts. While this allowed for the entire study to be completed within 3 months, prevented reviewer fatigue from the process,[11] and permitted the achievement of 100% consensus, more reliable results may be achieved with a larger panel. Again, until a national panel of experts can be convened, the current paper represents the best alternative and may serve as the industry standard.

Conclusion

The DM industry is in desperate need of a unified measurement and evaluation model that is sufficiently rigorous to attain scientific validity. This paper contributes to that goal by achieving consensus in codifying primary chronic conditions and directly related complications. Efforts should focus on ensuring that a standard set of codes is consistently applied in all evaluations of program effectiveness. Future industry-wide consensus panels should develop lists of codes for other chronic illnesses, and update all lists periodically as new clinical evidence becomes available.

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