

Special Article

The Use of the New York Heart Association's Classification of Cardiovascular Disease as Part of the Patient's Complete Problem List

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Summary: This paper extols the value of combining two systems in order to improve learning, teaching, communication, patient care, and clinical research in patients with heart disease. This is accomplished by using Weed's recommendation regarding the creation of a complete Problem List and, within this context, characterizing the cardiac or vascular problem according to the recommendations of the New York Heart Association.

Key words: classification of heart and vascular disease, New York Heart Association, problem-oriented record

Classifying Heart Disease

The classification of information makes for orderliness; but orderliness, for most individuals, without the appreciation of value, is not sufficiently rewarding to sustain the effort of classifying. The purpose of this essay is to highlight the practical value of using the New York Heart Association's classification of cardiovascular disease and to emphasize its use in the context of the patient's complete Problem List.

The Union of Two Systems

The system discussed here was created by the union of a complete Problem List as defined by Weed¹ and the classifi-

cation of the cardiovascular disease as recommended by the New York Heart Association.²

The Complete Problem List

The problem-oriented record as described by Weed consists of a defined Data Base, Problem List, Plans, and Progress Notes.¹ This dissertation is confined, for the most part, to a discussion of the Problem List. A complete Problem List evolves from an analysis of a defined Data Base. The Data Base includes the information derived from the patient's history (symptoms and other available medical information), physical examination, electrocardiogram, chest x-ray film, "routine" laboratory data, and the results of high-tech procedures.

The information to be collected is determined by the individual who collects the data. If the goal of the primary care physician is to give comprehensive care, then the data necessary to screen all the body systems for disease must be collected. If the physician is a subspecialist, such as a cardiologist, he or she must collect data from the patient that allows him or her to identify the presence or absence of heart disease. In addition, the cardiologist must also obtain sufficient information about other body systems to allow him or her to make sound decisions about the following: the prognosis of the patient with multiple diseases in addition to heart disease, the indications for other diagnostic cardiac procedures when other noncardiac problems are present, and the advisability of using a specific type of cardiac therapy when such could make other noncardiac problems worse. One can be a good cardiologist without knowing the patient's noncardiac diseases, but an individual cannot be an excellent cardiologist without knowing all of the patient's problems.

The problems recorded on the complete Problem List are created by analyzing the defined Data Base and using the data to synthesize a new perception of the patient's difficulties. The new perception is called a problem statement. This action by the brain is known as thinking. The problems are numbered, titled, and placed on a separate part of the patient's record. The individual who creates the Problem List should ask two questions: are all the important items in the defined Data Base accounted for on the Problem List, either as problems or as attributes of a diagnosis; and, are there sufficient data in the de-

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defined Data Base to state the problems as they have been stated? The Problem List is not a summary of the data. There should be no "rule outs," probables, guesses, or differential diagnoses listed on the Problem List. To do so indicates the failure to understand the definition of a problem. For example, to record a problem as "rule out angina" is not acceptable because the examiner has avoided creating a differential diagnosis. If the examiner is not certain that the patient's discomfort is due to angina pectoris, he or she should state the problem as chest pain. A differential diagnosis should then be listed under the Plans portion of the record. The same is true for stating the patient "probably has angina." Here, the word probable blunts the examiner's thinking in that it excludes the need to create a differential diagnosis. The problem should be stated at the level of understanding based on the available information. If the etiology of a problem is not known, a differential diagnosis should be written under the Plans for the problem.

The New York Heart Association Classification of Heart Disease

One of the earliest attempts (1921) to classify heart disease was by Paul Dudley White and Merrill M. Myers.³ Dr. White developed a defined Data Base and completed it for each patient he examined. He characterized the heart problem according to etiology, structural change, and functional condition. In his classic article he mentioned and supported the development of a functional classification as suggested by the New York Heart Association of cardiac clinics.³ It appears that Dr. White and the New York group were moving toward the same goal.

The first edition of the book created by the New York Heart Association on the classification of cardiovascular disease was published in 1928. The ninth edition of the book was published in 1994. The classification has changed over the years as medicine has changed. The essential elements of the 1994 New York Heart Association classification are:² heart disease (or vascular disease), etiology, anatomy, physiology, functional status, objective assessment.

Further Comments on the Essential Elements of the New York Heart Association's Classification of Cardiovascular Problems

Etiology: The etiologies of cardiac and vascular disease listed here are somewhat different from the list presented in the book prepared by the committee of the New York Heart Association.³ Neither list is complete but the concept should be apparent. In some instances, the designation of an etiology may not be well defined because the true etiology is not known. In such cases the designation expresses all we know about the etiology at this point in time. For example, the etiology of sick sinus syndrome characterizes the problem but does not indicate the nature of the sickness.

Drs. White and Myers emphasized in their 1921 article that the establishment of an etiologic diagnosis was very important.³ They wrote:

One of the most important reasons for insisting on the etiologic diagnosis, besides allowing much greater accuracy in prognosis, is to forward the prevention of heart disease, about which the medical world is beginning to take more action than in the past.

The list of etiologies includes⁵ atherosclerotic coronary heart disease; other types of coronary disease (give type); hypertensive heart disease; rheumatic heart disease; congenital heart disease; aortic stenosis of the elderly; mitral valve prolapse due to myxomatous degeneration; other types of valve disease that are due to ergot, Fen-Phen, and traumatic valve disease; aortic regurgitation related to kyphoscoliosis, osteogenesis imperfecta, Marfan's syndrome, aorto-annulo ectasia, syphilis; dilated cardiomyopathy (including idiopathic, alcoholic, post myocarditis, drug induces such as from adriomycin); restrictive cardiomyopathy (give cause if known such as amyloid); hypertrophic cardiomyopathy (specify the subaortic, apical, or mid-ventricular type); infective endocarditis; chronic cor pulmonale (give causes of lung disease); acute cor pulmonale due to pulmonary embolism; primary pulmonary hypertension; secondary pulmonary hypertension due to progressive systemic sclerosis; ingestion of rape seed oil, or Fen-Phen; acute pericarditis (give cause when known or label the condition idiopathic); cardiac tamponade (give cause); constrictive pericarditis (give cause when known); neoplastic heart disease (give type of neoplasm); peripheral arterial disease such as atherosclerosis (aneurysm or obstructive), fibromuscular hyperplasia, Burger's disease, peripheral emboli (give source); arteritis (give type when known); varicose veins; peripheral arteriovenous fistula.

The etiology of the heart disease is recorded as unknown when lone rhythm disturbances and lone conduction system abnormalities are identified in patients with no other evidence of heart disease. These abnormalities include lone atrial fibrillation, lone supraventricular tachycardias, lone ventricular tachycardia, lone sick sinus syndrome, and lone right or left bundle-branch block. Under these circumstances the rhythm disturbances are also listed under *Physiology*.

When the rhythm or conduction system disturbance occurs in the setting of identifiable heart disease that is known to cause the rhythm disturbance or conduction system abnormality, the rhythm disturbance is listed under *Physiology*.

Anatomy: The examiner should identify and record whether the heart is large or normal size. This is accomplished initially by physical examination and the interpretation of the chest x-ray film and the electrocardiogram. Determining the size of the heart, as well as other anatomic abnormalities, is also accomplished by assessing the results of cardiac catheterization, coronary arteriography, and echocardiography when they are available. If the heart is enlarged, the chambers of the heart producing the enlargement should be stated.

If the results of a coronary arteriogram are available, they should be listed under *Anatomy*. Structural valve abnormalities and myocardial infarction should be listed under *Anatomy*.

For those who have not previously considered the creation of an anatomic diagnosis, it is useful to recall that any cardiac

or vascular abnormality that a pathologist can see without a microscope should be listed under the heading of *Anatomy*.

Physiology: There are five major physiologic consequences of heart disease. They are angina pectoris, heart failure (transient and chronic), rhythm disturbances (arrhythmias or conduction disturbances), syncope, and cardiogenic shock. The presence of these conditions should be listed under *Physiology*. The absence of these physiologic complications should also be listed because it is the only way another observer can determine whether the initial examiner did not elicit them or if he or she forgot to list them.

Valvular stenosis or insufficiency should be listed under *Physiology*.

Additional Comments Regarding Certain Physiologic Diagnoses

The words angina pectoris should never be used without the modifying words stable or unstable. The analysis of the patient's symptoms of "chest discomfort" with all of its variations, precipitating causes, and the number of days the episodes of discomfort have been present should enable the physician to determine whether the condition should be labeled as stable or unstable angina pectoris. It is well known that the molecular biology, pathophysiology, clinical manifestations, treatment, and prognosis are different in patients with stable angina pectoris than they are in patients with unstable angina pectoris. Therefore, angina pectoris is a generic designation, whereas the words stable and unstable designate specific subsets of the generic term.

The term "prolonged myocardial ischemia" can be used to identify an episode of myocardial ischemia that lasts longer than angina pectoris. For example, angina pectoris usually lasts 1 to 10 min if the patient discontinues the effort that produced it. Chest discomfort lasting 15 to 30 min or longer, that is thought to be due to myocardial ischemia, should cause the physician to be concerned that the ischemia is lasting longer than is usual when the cause is angina pectoris. Such patients may or may not develop objective evidence of myocardial infarction. When signs of infarction develop in the electrocardiogram, or if there is an elevation of creatine kinase in the serum, the condition is diagnosed as myocardial infarction and this is listed under *Anatomy*. As discussed below, when there are no objective signs of myocardial infarction in a patient with prolonged myocardial ischemia, the conditions may be classified as unstable angina with the realization that a finite number of myocytes may have died.

Heart failure is a complication of heart disease. It is usually the consequence of structural abnormalities. It must be listed under *Physiology* and must never be listed as a separate problem. The classification of heart failure is discussed in the section on *Functional Capacity*.

As stated earlier, when cardiac arrhythmias and conduction disturbances occur in patients with identifiable heart disease that is known to cause such arrhythmias and disturbances, they should be listed under *Physiology*. When heart disease cannot be identified, the cause of the arrhythmia or conduction distur-

bance should be listed as unknown under *Etiology* and the rhythm disturbance or conduction defect should be listed under *Physiology*. Some day, of course, the etiology of lone arrhythmias and conduction disturbances will be identifiable.

Syncope may be listed in several different ways depending on the circumstances. When syncope occurs in a patient without evidence of heart disease and the cause is not apparent, the condition should be listed on the Problem List as syncope→. The arrow indicates that the cause is not known and a differential diagnosis of the syncope is listed in the Plans. When syncope is obviously due to conditions such as vasodepressor or vagovagal syncope and there is no evidence of heart disease, the condition is listed as a separate problem. When syncope is obviously due to vasodepressor or vagovagal syncope in a patient with heart disease, but the syncope is clearly not related to the heart disease, the condition should be listed as a separate problem. When the syncope is due to aortic valve stenosis or idiopathic hypertrophic subaortic stenosis, it should be listed under *Physiology*. Syncope related to a rhythm disturbance is listed under *Physiology* along with the name of the specific arrhythmia when it occurs in patients with an identifiable type of heart disease. For example, syncope due to ventricular tachycardia should be listed along with the type of abnormal rhythm under *Physiology* in a patient whose heart disease is listed under *Etiology* as coronary atherosclerotic heart disease. When the syncope is due to a lone arrhythmia, and the etiology of the heart disease is listed as unknown, the rhythm disturbance and syncope are listed under *Physiology*.

Cardiac shock due to myocardial infarction should be listed under *Physiology*. The etiology of the condition, coronary atherosclerotic heart disease, should be listed under *Etiology* and myocardial infarction should be listed under *Anatomy*.

Physiologic data provided by high-tech procedures should be listed under *Physiology* if such test results are known. For instance, ejection fraction, wall motion abnormalities, ventricular pressure measurements, pressure gradients, shunts, and the results of thallium scans, positron emission tomography scans, etc., should be listed under *Physiology*.

Any cardiac or vascular abnormality that could not be seen by a pathologist should usually be listed under *Physiology*.

Functional capacity: The ability to classify the functional capacity of a patient with symptoms due to cardiovascular disease is fundamental to the understanding of the cardiovascular status of the patient. The heart's job is not simply to perform adequately at rest but to respond appropriately to exercise and other stresses.

Dyspnea due to heart failure is made worse with effort. Accordingly, the amount of effort with which a patient is able to perform without dyspnea should be determined. The New York Heart Association classification that is used to quantify the amount of effort required to produce dyspnea due to heart failure is shown in Table I. It is wise to remember that the classification grades only the severity of dyspnea and not the severity of heart failure itself.

The New York Heart Association classification, shown in Table I, that is used to classify heart failure was originally used to classify angina pectoris. It has been replaced with the Cana-

TABLE I Classification of the functional capacity recommended by the New York Heart Association (used for classification of dyspnea due to heart failure)

Functional capacity
Class I: Patients with cardiac disease, but without resulting limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea, or anginal pain.
Class II: Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain.
Class III: Patients with marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnea, or anginal pain.
Class IV: Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of heart failure or of the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort is increased.

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dian Cardiovascular Society classification of angina pectoris (Table II). Experience with this system has led us to the conclusion that it should only be used for stable angina pectoris.

Over the years several classifications have been used to classify unstable angina pectoris. The latest classification is by Braunwald and we recommend its use (Table III).

Prolonged myocardial ischemia without objective signs of infarction is currently classified as unstable angina, but it is important to realize that it may well be different from an episode of stable or unstable angina in that a few myocytes may have been damaged.

Objective assessment: The words used to describe the seriousness of the patient's cardiovascular problem have changed over the years. The words "objective assessment" are used in the ninth edition of the New York Heart Association classification.² It is now accepted that symptoms such as dyspnea due to heart failure or chest discomfort due to angina pectoris do not always parallel the seriousness of a patient's problem. This understanding has evolved because the objective data acquired by the use of new technology and the long-term follow-up of patients have given physicians more insight into the prognosis than was possible when symptoms alone were used to judge the seriousness of a disease. Accordingly, objective data, when available, are used to assist the physician in making a judgment regarding the seriousness of the patient's cardiovascular problem. For example, barely detectable chest discomfort due to unstable angina is much more serious in the patient with objective evidence discovered on coronary arteriography of left main coronary artery occlusion than it is in a patient with evidence of distal right coronary artery occlusion. In this example, the location of the coronary artery occlusion discovered by coronary arteriography is objective information that indicates the seriousness of the problem much more accu-

TABLE II The Canadian Cardiovascular Society's classification of stable angina pectoris

1. Ordinary physical activity such as walking and climbing stairs does not cause ... angina; angina with strenuous or rapid or prolonged exertion at work or recreation
2. Slight limitations of ordinary activity; walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, or in cold, or in wind, or under emotional stress, or only during the few hours after awakening; walking more than two blocks on the level and climbing more than one flight of ordinary stairs at a normal pace and in normal conditions
3. Marked limitation of ordinary physical activity; walking one to two blocks on the level and climbing one flight of stairs in normal conditions and at normal pace
4. Inability to carry on any physical activity without discomfort; anginal syndrome may be present at rest

Source: Campeau L: Letter to the Editor. *Circulation* 1976;54:522. Reproduced with permission.

TABLE III Braunwald's classification of unstable angina

Severity

- Class I: New-onset, severe, or accelerated angina
Patients with angina of less than 2 months' duration, severe or occurring three or more times per day, or angina that is distinctly more frequent and precipitated by distinctly less exertion; no rest pain in the last 2 months
- Class II: Angina at rest, subacute
Patients with one or more episodes of angina at rest during the preceding month but not within the preceding 48 h
- Class III: Angina at rest; acute
Patients with one or more episodes at rest within the preceding 48 h

Clinical circumstances

- Class A: Secondary unstable angina
A clearly identified condition extrinsic to the coronary vascular bed that has intensified myocardial ischemia, e.g., anemia, infection, fever, hypotension, tachyarrhythmia, thyrotoxicosis, hypoxemia secondary to respiratory failure
- Class B: Primary unstable angina
- Class C: Postinfarction unstable angina (within 2 weeks of documented myocardial infarction)

Intensity of treatment

1. Absence of treatment or minimal treatment
2. Occurring in presence of standard therapy for chronic stable angina (conventional doses of oral beta blockers, nitrates, and calcium antagonists)
3. Occurring despite maximally tolerated doses of all three categories of oral therapy, including intravenous nitroglycerin

Source: Braunwald E: *Heart Disease*, 5th edition, p. 1332. Philadelphia: W.B. Saunders Company, 1997. Reproduced with permission.

TABLE IV Objective assessment

No objective evidence of cardiovascular disease
Objective evidence of minimal cardiovascular disease
Objective evidence of moderately severe cardiovascular disease
Objective evidence of severe cardiovascular disease
Criteria for use of the terms minimal, moderately severe, and severe disease cannot be precisely defined. Grading is a judgmental process based on individual physicians' estimates.
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rately than the subjective information of mild unstable angina. The point is that the functional classification based on symptoms does not reveal accurately the seriousness of the cardiovascular problem. The New York Heart Association Committee, headed by Dr. Martin Dolgin, should be commended for creating this portion of the 1994 book on the subject.² It emphasizes the use of objective information provided by physical examination, radiography, electrocardiography, echocardiography, nuclear testing, cardiac catheterization, coronary arteriography, etc., to determine the seriousness of the patient's cardiac problem. This, of course, does not in itself suggest that all of these tests must be performed. For example, a huge heart detected on physical examination and on the chest x-ray film is always a serious objective finding. Recurrent ventricular tachycardia revealed in the electrocardiogram is a serious objective finding. A loud pulmonary valve closure sound and pulmonary valve regurgitation is a serious objective finding in a patient with mitral stenosis, and the discovery of an aortic left ventricular systolic pressure gradient of 150 mm of mercury by cardiac catheterization is a serious finding even in an asymptomatic patient.

The objective data that indicate the seriousness of cardiac problems must be appreciated by every physician because symptoms alone cannot be used to make such a determination routinely. It is necessary to know the results of acute and long-term follow-up reports of patients with cardiovascular problems in order to determine the seriousness of a patient's problem, and even then there is no sharp and guaranteed separation of the various classes of patients. The classification of the seriousness of cardiovascular disease based on objective data suggested by the New York Heart Association is a reasonable approach to this problem (Table IV).

Common Errors

The listing of hypertension on the Problem List is not adequate. Such a statement indicates a physical finding—not a diagnosis. If the data support the designation of *essential* hypertension, this should be so stated. If there is some reason to believe that the designation of essential hypertension is not correct, an arrow should be placed after the word hypertension and a differential diagnosis of hypertension should be listed in the section of the record labeled *Plans*. The modern classifica-

TABLE V Classification of blood pressure for adults aged ≥ 18 years

Category	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)
Optimal	< 120	and	< 80
Normal	< 130	and	< 85
High-normal	130–139	or	85–89
Hypertension			
Stage 1	140–159	or	90–99
Stage 2	160–179	or	100–109
Stage 3	≥ 180	or	≥ 110

Source: Canzanello VJ, Sheps SG: The sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Cardiology in Review* 1998;6(No. 5): 272–277. Reproduced with permission.

tion of untreated hypertension should be used to classify the condition (Table V).

The examiner should never formulate a problem as stroke or cerebrovascular accident without making an effort to determine the etiology of the catastrophe.

As discussed earlier, heart failure and angina pectoris must never be listed as separate problems because they are physiologic complications of heart disease. Accordingly, heart failure and angina pectoris should be listed under *Physiology* in the format suggested by the New York Heart Association; they should never be listed as separate entries.

An Example

An example of a Problem List that includes the use of the New York Heart Association classification of the heart problem is shown in Table VI.

TABLE VI Complete Problem List

John Doe, age 49	Date 1-5-99
1. Heart disease	
Etiology: Idiopathic dilated cardiomyopathy	
Anatomy: Marked enlargement of the heart	
All chambers dilate	
Physiology: Congestive heart failure	
Ejection fraction 15 by echo (1-3-99)	
Atrial fibrillation (ventricular rate 85 beats/min)	
Functional Capacity: NYHA Class III	
Objective Assessment: D	
2. Hypokalemia (2.2 meq/l)	
Etiology: Diuresis with furosemide	
3. Diabetes mellitus (type I)	
4. Essential hypertension (controlled)	
5. Benign prostatic hypertrophy	

The Value of the System

- A complete Problem List is derived from the analysis of the defined Data Base, which includes the results of the history, physical examination, electrocardiogram, chest x-ray film, and routine laboratory data. The generalist should create a data base that permits the delivery of comprehensive care. The subspecialist, such as a cardiologist, should create a data base that permits him or her to identify any type of cardiovascular disease and to discover the signs of noncardiac disease. The effort to accomplish this goal automatically improves the care of the patient.

All important abnormalities found in the data base should be accounted for on the numbered Problem List either as problems or as attributes of a diagnosis.

- The cardiologist can view the complete Problem List and determine whether the patient's noncardiac problems will influence decision-making about management of the patient's heart disease.

- The physician can also determine whether the patient's noncardiac problems are being managed or ignored. The cardiologist should not be satisfied to diagnose an uncommon type of heart disease and ignore the patient's need for colonoscopy or mammograms.

- Viewing the complete Problem List permits the physician to determine whether there is a noncardiac disease that is related in some manner to the patient's heart disease. Is the patient's atrial fibrillation related to hyperthyroidism? Does the patient's diabetes mellitus prevent the sensation of angina pectoris because of cardiac neuropathy?

- Noting the presence of a certain noncardiac problem on the patient's Problem List may prevent the misuse of a drug or procedure. For example, a patient with bronchial asthma should not be given a beta blocker for stable angina pectoris.

- The use of the New York Heart Association classification of heart disease is strongly recommended. Most physicians know about the functional classification of heart disease, but this is a small part of the entire classification that requires listing the *Etiology, Anatomy, Physiology, Functional Classification, and Objective Assessment* of the patient. All elements of the classification should be completed in order to understand all aspects of the patient's heart disease.

- The challenge to complete the information under each of these headings guides the student, house officer, and fellow in learning to collect data from the patient that will permit com-

pletion of the classification. Currently, it is not uncommon for trainees to perform the examination and do nothing with the information they discover.

- The practicing physician will discover that the creation of a complete Problem List and the classification of heart disease according to the New York Heart Association will enhance his or her ability to learn medicine and care for the patient. The system guides the physician so that important items are less likely to be overlooked. In addition, the system is an excellent way to present what really matters in a brief but complete manner. The communicative value of the system to a physician's associates, nurses, and others involved in the care of the patient will be apparent to those who use it.

- The Problem List and the classification of the cardiovascular problem according to the New York Heart Association is of great value to physicians who have the opportunity to teach. The system is a true teacher's dream.

- The use of the medical record for clinical research is greatly enhanced if a complete Problem List is created for each patient and if the New York Heart Association classification is used for the listing of the cardiovascular problem.

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Addendum

The system discussed here is used at Morning Report on the Cardiology Service at Emory University Hospital each morning (Monday through Friday) at 7:00 A.M. The house staff and fellows assigned to the Cardiology Service meet two senior staff members who discuss the Problem Lists the trainees have prepared on the new patients who have been admitted to the service. The discussion that ensues relates specifically to the patient's problems and how the trainees perceive them. Unrelated abstract discussions are avoided.