The Cloutterbuck Minimum Data Matrix: A Teaching Mechanism for the New Millennium

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ABSTRACT

The demands of the United States’ rapidly changing health care system and society signal the need to design and implement health professions programs which prepare students for practice within a health care paradigm that will be very different from the one existing today and for work with an increasingly diverse and independent consumer population. The Cloutterbuck Minimum Data Matrix (CMDM) is a teaching mechanism designed to generate a comprehensive base of consumer information prerequisite to the in-depth level of critical analysis and synthesis needed to produce quality health care outcomes in the 21st century. The CMDM assumes an interdisciplinary perspective and educates students to recognize and incorporate consumer diversity into strategies for care.

During the past 5 years, sweeping changes in the structure and finance of health care in the United States have resulted in a shift in emphasis from institution-based, illness-oriented care to community-based care which focuses on wellness (Blancette & Flarey, 1996; Pew Health Professions Commission, 1991, 1993, 1995; Relman, 1996). A system of managed care, which has as its goal the organization of the entire continuum of care “from health promotion to disease prevention to primary and secondary acute care, tertiary care, and long-term care…across episodes of illness and pathways of wellness,” is at the heart of this emerging paradigm (Shortell, Gillies, & Devers, 1995, p. 136). Within this broadly configured system, families, aggregates, communities, and populations will increasingly be targeted for care, and consumers will be held accountable for their own health.

In light of this rapid and radical transformation, health professions educators must:

- Create innovative practical experiences across a variety of institutional and community-based settings (Reilly & Oermann, 1992; Tagliareni, Sherman, Waters, & Mengel, 1991; Tanner, 1988; Thomas & Shelton, 1994).

Because of concurrent changes in the demographic and social fabric of the United States, health professions educators also are challenged to prepare students for work with an increasingly diverse consumer population. The Cloutterbuck Minimum Data Matrix (CMDM) is introduced to assist in these enterprises.

Impetus for developing the CMDM also comes from the authors’ combined 40 years of experience as nurse educators in three major areas of concern. First, it has been observed that students have difficulty conceptualizing consumers beyond the institutional, individual, biomedical perspective. Because great emphasis is placed on assessing and monitoring disease processes and their complications, information regarding consumers as whole people is often secondarily and superficially sought. Students seldom discern the life circumstances or chain of events that have jeopardized consumers’ health prior to hospitalization; nor do students consider the wide range of factors that will influence consumers’ health during the immediate post-hospital period and beyond. This lack of perspective translates into narrow assessment during hospitalization and sets the stage for discharge planning.
that may be generic and incomplete. Abbreviated assessment and planning based on it will thwart students' efforts to help consumers achieve positive health outcomes in the 21st century.

Second, students often underestimate the impact that characteristics such as age, gender, race, culture, social class, and family/community dynamics have on consumer health status and behavior. It is little wonder then that students fail to recognize the powerful effect these characteristics, in synergy, have on health care outcomes.

Third, students do not consider mediation of the broad environmental factors that position consumers for wellness or place them at risk for illness (Milho, 1976) to be an important role expectation (Chopoorian, 1990). Assuming responsibility for advocacy beyond the hospital walls and modifying factors in the larger environment for the purpose of improving health are not integral to student thinking. The CMDM is designed to address these three areas of concern and help educate and socialize baccalaureate-level students for practice in the 21st century. It is comprised of a set of empirical variables known to influence consumer health status, behavior, and outcomes. The CMDM variables are distributed across three dimensions:

- **Personal**
- **Situational**
- **Structural**

Information generated by the CMDM creates a comprehensive consumer profile reflecting their subjective and objective realities. The depth and breadth of CMDM data will be necessary for effective problem solving, critical analysis, and strategic planning for consumer empowerment and quality health care outcomes within the emerging paradigm.

Personal dimension variables within the CMDM describe consumers' psychosocial-spiritual, lifestyle-behavioral, and physiologic-genetic characteristics (Table 1). Together, these variables represent consumers' internal context. Certain variables within this dimension, such as medical diagnoses and treatment regimens are familiar to traditional biomedical health care. Others, such as consumer health beliefs and practices, are becoming increasingly important in the emerging paradigm. The CMDM emphasizes attention to a broad range of personal factors known to affect consumer health.

THE CMDM

The CMDM (Figure) is a teaching mechanism designed to prepare health professions students for practice in the
TABLE 1  
**Personal Dimension Variables**
- Age, Gender.
- Race, Ethnicity/Culture.
- Country or State of Origin, Linguistic Ability.
- Health Status: Objective/Subjective.
- Mental Status, Cognitive Status.
- Medical Diagnosis, Related Information.
- Treatment Regimen, Knowledge of Condition.
- Education, Literacy Level.
- Occupation: Present Status/Work History.
- Health Beliefs/Practices.
- Lifestyle, Sexuality.
- Risk Factors, Self-Care.
- Religion, Spirituality.

TABLE 2  
**Situational Dimension Variables**
- Income: Source/Amount.
- Health Insurance Coverage.
- Marital Status, Living Arrangement.
- Family: Structure/Dynamics.
- Community: Structure/Dynamics.
- Social Program Eligibility.
- Availability of Help: Emergency/Regular.
- Housing: Type/ Adequacy.
- Transportation: Public/Private.
- Physical Environment, Safety.
- Sociocultural/Ideological Milieu.

Situational dimension variables within the CMDM describe the objective conditions immediately external to consumers (Table 2). Included are the structure and dynamics of the family, neighborhood, and community; microlevel cultural and ideological influences; and personal demographic characteristics which are not intrinsic to the consumers (e.g., marital status, living arrangement, income, health insurance coverage). These variables represent consumers' microcontext and regard the personal, material, and financial resources available to consumers.

Structural dimension variables within the CMDM represent conditions within the broader environment that indirectly influence consumer health status, behavior, and outcomes (Table 3). They describe the consumer's macrolevel context and include:
- The larger physical environment.
- Political-economic context at the local, state, and national levels.
- Regional and national cultural and ideological influences.
- Population-level demographics.

The overall organization of health and social services, and selected social, health, and public policies and regulations are placed here because they, too, profoundly impact consumer health and well-being.

The importance of structural level variables as a basic component of consumer assessment is described by Estes, Fox, and Mahoney (1996):

An individual's health and the choices he makes about it take place within a broader sociocultural context. Social values, customs, and public policies—especially those that bear on the economy, the environment, financing and delivery of medical care, prevention, social services, and the policies of business, and industry, and the media—all shape the context of the individual's lifestyle and health (p. 66).

McKinley (1979), further explicates this point by invoking the image of a swiftly flowing river to represent illness. McKinley contends that "downstream" is where illness occurs and where the medical profession has focused its emphasis. There, health care professionals are so busy leaping into the river to rescue the ill, injured, and infirm they have little time to refocus their attention "upstream" to examine what is pushing people into the water in the first place. According to Butterfield (1990):

Downstream endeavors are characterized by short-term, individual-based interventions...upstream endeavors focus on modifying economic, political, and environmental factors that have been shown to be the precursors of poor health (p. 66).

The downstream perspective in McKinley's analogy has received the greatest emphasis in health professional education curricula. The CMDM requires students to consistently regard consumers' upstream reality. Through use of the CMDM, students are more likely to learn that mediation or modification of structural factors in the broad environment is integral to their role responsibility, and to consider the question of social justice in health care.

The CMDM automatically incorporates the upstream perspective into the curriculum through identification and explanation of structural variables and through use of case study analyses which examine the impact of those variables on consumer health. In the clinical setting, students apply the upstream perspective by identifying consumer variables in the structural dimension that may be modified or mediated to support positive consumer health care outcomes. A student is, for example, assigned to care for Mr. S., a 52-year-old White man with a history of heavy smoking, who has been hospitalized because of an exacerbation of emphysema. Mr. S. is also newly diagnosed with Type II diabetes.
Although Mr. S. has already developed chronic conditions and can be considered downstream, upstream considerations of Mr. S.'s case cannot be precluded. Through use of the CMDM, clinical faculty can help the student identify and examine structural factors that may have contributed to Mr. S.'s present downstream health problems, thus reinforcing the student's appreciation of the importance of primary prevention (and the implications of a lack thereof). Coupled with an analysis of data from other CMDM dimensions, a comprehensive base of information on which to strategize realistic approaches to Mr. S.'s care at the secondary and tertiary levels of prevention will help empower him to participate in the management of his chronic conditions. The faculty member can also require the student in this example to suggest strategies that either might have been taken or might be taken to modify or mediate variables in the structural dimension of the CMDM that have contributed or are contributing to Mr. S.'s chronic conditions. Support of state and national legislation prohibiting the sale of cigarettes to minors, funding for anti-smoking and healthy nutrition education programs in primary and secondary schools, and support of community-level efforts to ban smoking in public places are examples.

The CMDM variables are not inclusive, exhaustive, or prioritized. However, they are considered to be the minimum data required to plan for and achieve effective outcomes of consumer health care. Variables included in the CMDM are identified consistently across health and social science literature as having significant influence on consumer health and well-being and have been substantiated by practical experience. Variables included in the matrix are not so broad as to be impractical, yet are not so narrow to exclude information important to generating a comprehensive consumer profile as the basis for critical analysis and synthesis. Individual curricula or health professions programs may include additional variables suited to their own perspectives or needs.

The descriptive and analytic power of each variable within the CMDM is enhanced when it is broken down into its respective subcategories. The variable Income: Source/Amount, a situational dimension variable in Table 2, is used here to exemplify the subcategories of a single CMDM variable. This variable examines:

- Income: Amount—the consumers' total annual income, which is subcategorized into increments ranging from ≤ $5,000 to ≥ $50,000.
- Income: Source—which is subcategorized into wages, pensions, dividends, assets, Social Security, Aid to Families with Dependent Children (AFDC), Supplemental Security Income (SSI), and other assets, if any.

When the CMDM variable Income: Amount/Source is subcategorized in this way, the level of detail it generates can help determine the adequacy of consumers' income to meet their needs, as well as ascertain their eligibility for public or private programs and services.

The following example shows the utility of the single variable Income: Amount/Source. A student, placed in a community-based setting, is working with Ms. J., a frail, 72-year-old, never married, retired Black woman who lives alone. As part of the consumer assessment using the CMDM, the student asks about Income: Amount/Source. Ms. J. reports her source of income is a monthly Social Security check in the amount of $498.00. Other assets or sources of income are denied. The student analyzes this information and draws tentative hypotheses regarding Ms. J.'s financial situation and its implications for her health and well-being. Among them, the student hypothesizes Ms. J. may be eligible for SSI. This is a federally funded program designed to assist the poorest disabled or blind individuals and the most impoverished elderly people who have less than $2,000.00 in assets. Ms. J.'s income from Social Security places her well below the federal poverty threshold for a single member, elderly household.

After obtaining Ms. J.'s permission, the student checks with the local Social Security administration office to confirm eligibility for SSI. After status is confirmed, the student informs Ms. J. of the possible benefits available to her.

Supplemental Security Income will add a small, but important, additional monthly cash benefit to help pay for rent, utilities, or other basic needs. Under SSI, Ms. J. is eligible for participation in the Medicaid program and may be eligible for food stamps. Medicaid will cover most of Medicare's copayments and deductibles. Such assistance will reduce Ms. J.'s out-of-pocket health care costs, thereby theoretically increasing her access to needed care. Under Medicaid, Ms. J. may also be eligible to receive community-based home care services such as home health aides and homemaker's aides to assist with personal care (i.e., activities of daily living) and household chores (i.e., instrumental activities of daily living). Such services will help her maintain her independence and quality of life in the least restrictive environment, the home setting. Should Ms. J. decide to participate in the SSI program, the student can support her journey through what can be a convoluted governmental bureaucracy.

The variable Income: Amount/Source is considered here in isolation of other variables in the CMDM simply
to demonstrate the enhanced utility of a CMDM variable when it is broken down into subcategories. The CMDM variables should be analyzed together to identify the consumers' needs, deficits, and barriers to care, as well as to capitalize on strengths, resources, and abilities. Because most CMDM variables are empirical, data can be gathered in a variety of ways including observation; talking with consumers, their families or significant others; contacting interdisciplinary health and social service providers or reviewing their documentation; and examining publicly available neighborhood, municipal, state, and national data.

The CMDM assumes an interdisciplinary approach in which many health professions contribute to data-gathering and assessment. In the clinical area, some of the data called for by the CMDM may have already been gathered by other members of the health care team. Data gathered by students (or others) should always be considered within the overall framework of the CMDM and be part of an ongoing effort to construct a comprehensive consumer database.

The CMDM is patterned on the concept of von Bertalanffy's (1968) general systems theory in which complex elements in interaction provide a framework which integrates otherwise unconnected parts. Use of the CMDM socializes students to regard consumer health as a dynamic, multifaceted entity. It represents an open system which allows the synergistic interaction of variables within and among its three dimensions. Because the whole of the CMDM is greater than the sum of its parts, consideration of a single dimension or variable, in isolation of others, can result in a limited view of the consumers' personal, situational, and structural realities. Because elements within the CMDM are in constant motion as they exert influence on one another, a change in one element may cause a change in others.

The Figure displays the variables that comprise the personal, situational, and structural dimensions of the CMDM. Collection and analyses of data generated by variables within each dimension form the basis for determining consumers' health and functional status along wellness-illness/independence-dependence continua, which suggests the level of prevention (i.e., primary, secondary, tertiary) and care, and in turn, determines the appropriate locus of care (i.e., acute care hospital, community-based setting, long-term care facility). The outcome of care feeds back into the data-collpecting phase of cyclical events to evaluate the effectiveness of original CMDM consumer assessment, planning, and implementation of care.

The Figure also illustrates the interactive, dynamic nature of variables within the CMDM and suggests the ongoing, interdisciplinary nature of decision-making regarding consumer health. Quality health care in the emerging paradigm will depend increasingly on interdisciplinary health teams similar to performers in a symphony orchestra or jazz ensemble. Players know their own and others' parts. Together they create a product one alone could not achieve. The effort may be orderly and predictable or chaotic and uncertain depending on the interaction of variables within the CMDM and the health care team. Using a holistic, synergistic systems approach to learning will help students become effective members of the interdisciplinary health care team.

Garman's notion of construal (1986) is also incorporated into the CMDM. Construal is a generic description that suggests envisioning complex units of information in a manageable format that facilitates examination and interpretation. Garman's idea requires the arrangement of data in such a way that it transcends the significance of individual data bits. Data analysis is the key to its success. The CMDM supports Garman's notion by providing a mechanism as a basis for analysis and planning that captures and categorizes large amounts of consumer data and makes them more manageable for strategizing and implementing reality-based consumer care.

The CMDM is also grounded in and congruent with the problem-solving process. However, many authors (Alfaro-LeFevre, 1995; Schon, 1987) believe the linear thinking employed in problem solving is not sufficient for the kinds of judgments and decision-making required for assessing, planning, and implementing care in the emerging health care paradigm. They suggest critical thinking must also be included. Critical thinking is

An investigation whose purpose is to explore a situation, phenomena, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can be, therefore, convincingly justified (Kurfiss, 1975, p. 2).

Brookfield (1987) describes four aspects of critical thinking stimulated through analysis of data generated by CMDM variables:

- Identifying and challenging assumptions.
- Recognizing the importance of context.
- Imagining and exploring alternatives.
- Employing reflective skepticism.

The CMDM structures critical thinking by requiring students to analyze the dynamic interplay of the multiple variables within and among the CMDM dimensions. Critical thinking and analyses lead to the generation of hypotheses regarding what is happening in the lives of the consumers and forms the basis for strategic intervention and evaluation of care outcomes.

For example, a student placed in a municipal ambulatory care clinical practicum has been working with Ms. G., a severely hypertensive 45-year-old consumer from Honduras. The student learns Ms. G. has been taking her antihypertensive medication. Aware of the powerful negative consequences of this behavior for Ms. G., the student becomes frustrated because the carefully planned health teaching is being ignored. The student labels Ms. G. as noncompliant and wonders what to do next regarding the situation.

Had the student assessed Ms. G. using the CMDM, analysis of the data generated would have triggered more informed and reflective thinking regarding Ms. G. Guided by analysis of CMDM data, the student could have
hypothesized (the word hypothesis is used here in the sense of a plausible explanation for something, not in its scientific sense) possible barriers keeping Ms. G. from taking her medication. Finances, access to a pharmacy, cultural connotation of disease causation, language barriers, or some other factor may have helped explain the phenomenon. After these tentative hypotheses had been tested with Ms. G. and against the data in her CMDM profile, a mutually agreed on strategy could have been implemented with Ms. G. to mediate whatever was preventing her from participating in her own care.

The CMDM also embraces concepts basic to the health sciences: person (human), environment (society), health (continua), and discipline-related actions (Flaskerud & Halloran, 1980; Fawcett, 1984). Variables within the CMDM are germane to a number of disciplines and are drawn from a variety of sources in the literature (Few Health Professions Commission, 1991, 1993). This increases the likelihood that the CMDM will be adapted across theoretical constructs, program perspectives, and disciplines. Because CMDM terminology is nonspecific to any one discipline, its utility in cross-specialty and cross-disciplinary communication and planning is enhanced.

The knowledge base for deriving meaning from variables within the CMDM and for understanding the synergistic interplay that occurs between them is drawn from courses in the natural and behavioral sciences, the humanities, and from the disciplinary science and practical experiences which support it (Miller & Malcolm, 1990). Teaching mechanisms such as the CMDM are supported by courses and content that will prepare students for effective practice in the new millennium. The CMDM can also help students organize knowledge as it is introduced across the curriculum in disciplinary, interdiscipli- nary, and nondisciplinary courses.

The CMDM is introduced in the first disciplinary course to establish overall context. It is used thereafter in each successive disciplinary and interdisciplinary course in the program. Although selected CMDM dimensions or variables may receive emphasis at different points across various health professions programs, they are always present within the context of the overall CMDM. The novice learner may perceive the CMDM to be overwhelming. However, with consistent usage, the collection and analysis of information provided by the CMDM should become second nature. The advent of computers in health care and the growing sophistication of electronic synthesis of data will further dwarf this seemingly informational giant.

The CMDM is not the first mechanism to systematically organize consumer data as a basis for planning and delivering effective health care. The Nursing Minimum Data Set (NMDS) (Hayes, Norris, Martin, & Androwich, 1995; McClosky & Bulecke, 1992; Werley & Lang, 1988), the North American Nursing Diagnosis Association (NANDA) classifications (NANDA, 1990), and the Omaha Classified System (Martin & Scheet, 1992) represent three others.

The NMDS documents 16 data elements drawn from hospital-based information. The NMDS is most useful for institutional nursing administration and research. It lacks the comprehensive base of data needed to plan and implement care across settings in the emerging paradigm.

The NANDA has developed a classification system of nursing diagnoses. A nursing diagnosis is a clinical judgment about an individual, family, or community response to actual or potential problems and life processes...which...provide the basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable" (NANDA, 1990, p. 50).

Although the NANDA classification system has many benefits, it remains largely acute-care oriented and is said to take a packaged approach to care which constrains inference and intuitive thinking (Hegyvary & McDonough, 1984; Shamanski & Yanni, 1983). It is also thought by some to be ethnocentric and culturally limiting (Cunningham, 1992; Geissler, 1991a, 1991b, 1992; Leininger, 1990), thereby inadequately addressing the needs and issues of consumers who fall outside the White, middle-class system of philosophies, values, norms, and customs. In its present form, the NANDA system may limit critical analyses sufficient to produce the holistic, contextual, consumer-based, setting-appropriate care necessary for positive consumer outcomes within the emerging paradigm.

The Omaha Classified System, used to standardize and systematize nursing diagnoses in home health agencies, generally meets the informational needs for caregiving in the emerging paradigm but contains few of the important structural variables. While each of these three mechanisms makes a special contribution within nursing, each is limited in preparing students for the complexity of practice in the new millennium.

MAINSTREAMING THE CONCEPT OF DIVERSITY

A second major feature of the CMDM is its ability to prepare students for practice with an increasingly diverse consumer population. The substantial demographic and social changes occurring in the United States are exemplified by:

- The precipitous increase in absolute and proportional numbers of older adults (Rice, 1989; United States Bureau of the Census, 1989).
- The unprecedented growth in the number and variety of subcultures and ethnic minority people of color (Hayes-Bautista & Rodriguez, 1993; Henry, 1990; Rix, 1990; United States Bureau of the Census, 1994).
- The intensifying social stratification within the nation's class structure (Almer & Dull, 1982; Auslander, 1992; Health Trends, Inc., 1992; Horton & Smith, 1990; Williams, 1990) make encountering differences within the population much more likely now than in the past.

The CMDM prepares students to conceptualize and embrace diversity as a normative expectation within the
The concept of mainstreaming diversity builds on the work of others who have championed this approach including Andrews and Boyle (1995); Branch and Paxton (1976); Kavanaugh and Kennedy (1992); Leininger (1978, 1990, 1991); Spector (1988); and Orque, Block, and Monroy (1983). For example, the CMDM incorporates Kavanaugh and Kennedy’s (1992) broad definition of diversity as occurring wherever there are differences, whether those are rooted in age, culture, health status, experience, gender, sexual orientation, or other aspects of sociocultural description and socioeconomic position” (p. 5).

This conceptualization of diversity socializes students to anticipate differences within the population as a normal expectation and supports the recognition, respect, and incorporation of diversity into strategies of care that empower the consumer (Kavanaugh & Kennedy, 1992).

Until recently, students have been at risk of perceiving those who fall outside of the “predominant culture’s Western philosophical principles which are European-American, middle class, Christian, and male-oriented” (Kavanaugh & Kennedy, 1992, p. 5) as being somehow deviant, alien, and in need of change (Lieberson, 1985). Textbooks within the health professions have tended to build their portrayal of consumers on the group most studied by biomedical research in the United States—White, middle-class men (Gamble, 1993; Hall et al., 1994). Empirical study of health and illness in other groups within the population has not been as extensive nor have its findings been disseminated as widely. Additionally, approaches to health care interventions developed for the traditional consumer prototype may be inappropriate for those who do not fit that description (Barker, 1992).

To address these issues, the CMDM avoids holding prior assumptions regarding consumers. It takes an open, “fill-in-the-blanks” approach to their depiction. As information regarding consumers is collected for the three dimensions of the CMDM, a profile depicting consumers’ unique personal, situational, and structural realities emerges. This consumer-specific profile is used as the basis for assessment, critical analyses, and strategic planning for consumer-centered interventions that improve the likelihood of a quality outcome of care.

MULTIPLE USES OF THE CMDM

The multiple uses of the CMDM are listed in the Sidebar on this page. In addition to features already mentioned, the CMDM is useful for developing simulated learning experiences in classroom settings. Its potential for creating hypothetical learning situations such as case studies, role play, and interactive computer applications is almost limitless given the range and depth of CMDM variables. The CMDM can also be used to generate information for health professions administration and research.

This initial effort introduces the CMDM conceptually.

The CMDM is comprised of a comprehensive set of empirical variables of common interest across disciplines. Data derived from the CMDM communicates information regarding consumers’ strengths, resources, and abilities, as well as their risks, needs, and deficits. Determinations regarding care are derived from critical analysis, synthesis, and objective reflection of multiple interacting consumer characteristics (i.e., personal, situational, structural). The product of this judgment, ideally authenticated by consumers, directs the health care team to set realistic care targets and develop workable care strategies empowering consumers to participate in managing their own care and modifying or mediating the circumstances on which their health rises and falls.

Although the CMDM can stand alone as a comprehensive checklist of consumer variables important for assessment and analysis, as a teaching and learning tool it best serves as a catalytic guide to developing mental processes important to the provision of health care in the 21st century. The inculcation of holistic assessment, critical analysis, and interdisciplinary decision-making can be accomplished through a variety of methods including case presentations, case study analyses, preconferencing and post-conferencing, and written assignments.

The CMDM has been pretested for clarity and utility with two groups of senior-level baccalaureate students.
enrolled in a Community Health Nursing course (N = 148). Feedback from a structured questionnaire and comments, which were provided to students on completion of the course, helped refine CMDM variable labels and reconfigure its graphic depiction. Findings indicated students used the CMDM with individual and community-level consumer targets. Selected student comments follow:

- "The CMDM helped me to view my patient from many different angles and incorporate the different points in my plan of care."
- "It's a nice, quick reference to jog one's memory at a glance for all the factors to consider in a client's evaluation."
- "It allowed me to really think about the client and his or her background so I had a well-rounded understanding of who they are. I could then provide care appropriately."
- "It was useful in our community assessment which dealt with domestic violence."
- "Everything came together for me with the actual use of this tool. I was able to use critical thinking, nursing process, and apply theory to my clinical work."

The process of refining and developing the CMDM continues. A demonstration project with nursing students in three clinical courses in the sophomore and junior years will be implemented to test for clarity, utility, benefits, and pitfalls of the CMDM at these levels. Preliminary reliability and validity of the CMDM variables will be sought through test-retest reliability coefficients and expert judgment on content validity from the broader education and health care community. Further description of efforts to refine the CMDM are beyond the scope of this article.

SUMMARY

Transformational changes in health care and society in the United States today compel health professions educators to rethink outmoded assumptions that have guided program development for the past 50 years. Health care professionals in the 21st century will need, "More than just sheer information, they will need a greater sensitivity to context, variety, and ambiguity" (Keeling & Ramos, 1995, p. 35). The ability to think, problem solve, critically analyze, derive meaning from vast informational input, and adapt to diversity within the environment will be key skills. Current health professions students are being prepared for practice in a post-biomedical era of care where they must "Deal with the complexity, ambiguity, and unparalleled change that characterizes our world" (Vaglia & Bruderle, 1997, p. 16). In addition to building a safe and effective biomedical base, the education of baccalaureate-level students must:

- Emphasize wellness and facilitate interdisciplinary collaboration and management of care across practice settings.
- Highlight consumer empowerment for self-care within the parameters of the consumers' own realities.
- Build skill in advocacy and mediation at the individual, family, community, and structural levels of society. Such skills and perspectives will be vital to an effective practice in the new millennium. The CMDM—an evolving, broadly applicable teaching and synthesizing mechanism—can serve as a catalyst in this endeavor.

REFERENCES


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