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Acuity and Case Management

A Healthy Dose of Outcomes, Part I

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ABSTRACT

Purpose of Study: This article presents acuity and dosage as two concepts that describe how the business case for case management (CM) can be made. Dosage and acuity concepts are explained as client need-severity, CM intervention-intensity, and CM activity-dose by amount, duration, extent, and timing. Concepts are related to the practice of CM using evidence-based knowledge and methods to develop instruments that measure and score pivotal CM actions. The purpose of this series of three articles is to introduce the two concepts of dosage and acuity, discuss their importance for making the business case for CM and for translation into evidence-based practice, and present a powerful example of how they can be used in everyday CM. The articles feature a specific exemplar, the CM Acuity Tools project, and explain how the melding of the acuity and dosage innovations will improve the capture of CM outcomes. Part I focuses on the CM Acuity Tool© instrument.

Primary Practice Setting(s): The article's information applies to all CM practice settings, and contains ideas and recommendations useful to CM generalists, specialists, supervisors, and outcomes managers. The Acuity Tools Project was developed from frontline CM practice in one large, national telephonic CM company.

Methodology and Sample: For dosage, the Huber-Hall Dosage Model and its testing are described and explained. The intersection of dosage and acuity is analyzed. For the Acuity Tools Project, a structured literature search and needs assessment launched the development of the suite of acuity tools. The resulting gap analysis identified that an instrument to assign and measure case acuity specific to CM activities was needed. Clinical experts, quality specialists, and business analysts ($n = 7$) monitored the development and testing of the tools, acuity concepts, scores, differentials, and their operating principles, and evaluated the validity of the acuity tools' content related to CM activities. During the pilot phase of development, interrater reliability testing of draft and final tools for evaluator concordance, beta (β) testing for content accuracy and appropriateness, and representative sample size testing were done. Expert panel reviews occurred at several junctures along the development pathway, including after initial tool draft and both before and after β-tests ($n = 5$) and pilot tests ($n = 28$). The pilot testing body ($n = 33$) consisted of a team of case managers ($n = 28$) along with quality analysts ($n = 2$), supervisory personnel ($n = 2$), and the lead product analyst (the developer). Product evaluation included monitoring weekly reports of open cases for the 28 case managers for 3 months (June to August 2000).

Results: Positive results generated approval from the expert review panel to apply the suite of acuity tools beyond (1) the initial draft phase, (2) the test population phase, and then (3) at a national CM organization level.

Implications for Case Management Practice: This article defines and discusses acuity and dosage as two practical conceptual tools that successfully unite clinical quality and business practices and measure and analyze CM activities. The CM Acuity Tool© is a master conceptual framework in three dimensions that synthesizes key components of CM practice, organized into indicators, drivers, and subdrivers. To show value, case managers need to access the evidence base for practice, use tools to capture quantities of intervention-intensity, and specify the activities that produce better outcomes.

Leaders call for case managers to demonstrate positive results. Mastal (2000) noted that to prove value, case managers must report intervention outcomes and develop indicators specific to each practice environment. She challenged case managers to "define the indicators of our worth, select valid measurement tools and processes, and share the outcomes with colleagues and employers" (Mastal, 2000, p. 10). The outcomes quandary for case managers hinges on a persistent absence of one

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Previous efforts to make the CM business case employed one of two different strategies: showing positive cost savings or demonstrating cost avoidance. However, another approach exists.

established way to best measure the worth of and to make the business case for case management (CM). Establishing a best method requires blending outcomes measures that feature service provision elements specific to the positive results that occur from actions case managers take on behalf of their clients with a configuration that can be translated into a financial formula.

Previous efforts to make the business case of CM employed one of two different strategies: showing positive cost savings or demonstrating cost avoidance. However, another approach exists. To make the business case for CM effectively, case managers need to move past the outcomes goal of the "absence of bad outcomes" (Powell, 2000, p. 59) and into the goal of applying evidence-based practice (EBP). EBP assists case managers to define terms of worth such as primary and secondary effects of illness severities; treatment appropriateness; efficient cost-saving management; and improvements for clients, providers, and payers. Going beyond the business case for CM means integrating financial measures into CM practice. The purpose of this series of two articles is to introduce the three concepts of dosage and acuity, discuss their importance for making the business case for CM and for translation into EBP, and present a powerful example of how they can be used in everyday CM. Part 1 presents the background on dosage and acuity, discusses the business case for CM, and introduces the Acuity Tools Project. Part 2 describes the Acuity Tools Project in greater depth and features the two measurement instruments, CM Acuity Tool© and AccuDiff©. Part III explains how to apply the concept of CM dosage and the outcomes instruments that measure CM acuity.

Dosage

The actual activities carried out by healthcare providers in the delivery of an intervention and the amount of time these activities take are two key variables that form the core of the specification of an intervention. Notwithstanding the call for dosage (Brooten & Naylor, 1995), little has been done to actually describe and test either nurse-sensitive or CM-sensitive dosage. Such specification is important in order to be able to measure, compare, and then evaluate interventions as to their effectiveness and cost. Practice improvement is dependent upon such measurement and evaluation. Researchers have identified the need to capture the dose of an intervention as an urgent problem (Lindsay, 2004). However, dose has been difficult to understand and measure in CM practice because it is not as intuitive as is the dose of a medication. Brooten and Youngblut (2006) noted that the dictionary definition of dose is a measured quantity of medicine or a therapeutic agent, and they conceptualized nurse dose as having three components: (1) dose (either the number of nurses or amount of care by nurses), (2) nurse (education, expertise, experience), and (3) host response (either patient or organizational receptiveness). Their measures included patient/staff ratios, amount of nurse time, and the nurse's education and expertise. They noted that the outcomes most commonly used to measure nurse dose are mortality, morbidity, patient satisfaction, and healthcare costs (Brooten & Youngblut, 2006). Unfortunately, these variables and measures do not capture the complexity of interventions, especially in CM; are not sensitive to the work that nurses or case managers do; nor do they generate ongoing process-level information needed to link dose to outcomes in a way that compares and evaluates for contemporaneous quality and cost management. A sound and tested dosage methodology will exhibit better matching capability or titration of interventions and associated activities. This is the wasteful "fire hose" effect where provider interventions such as CM are poured on without careful analysis. In the opposite undertreatment effect interventions and activities are restricted because of cost factors and then result in sequelae, such as occurred when the restriction of childbirth coverage to 24 hr in a hospital was legislatively reversed on the basis of unsafe patient care incidents.

Starting with questions from the scientific community and federal funding sources about how to address *dosage* of a provider's intervention, Huber and colleagues (Huber, Hall, & Vaughn, 2001; Huber, Sarrazin, Vaughn, & Hall, 2003) developed a definition and conceptual model of intervention dosage in CM based on the work of Ridgely and Willenbring (1992) and Sidani and Braden (1998) and then tested it in substance abuse treatment. In the Huber-Hall Dosage Model, the dosage of a provider intervention is defined as the amount, frequency, duration, and breadth of actual activities used in an intervention, as a unique combination of discrete provider actions, at a level of intensity (amount and frequency), over a duration of time (Huber et al., 2001). Dosage encompasses both intervention integrity (Did the provider actually deliver the intervention?) and client

engagement (Did the client actually participate?). For dosage, it is imperative that the intervention be fully and clearly described (Huber et al., 2003). Huber et al. (2001, p. 122) identified and defined the four essential elements of intervention dose as:

1. *Amount:* The quantity of the target activity in one episode.
2. *Frequency:* The rate of occurrence or repetition.
3. *Duration:* How long the activity is available over time.
4. *Breadth:* The number and type of possible intervention components or activities.

CM is a healthcare provider intervention and process used to deliver services related to client education, monitoring, surveillance, and care coordination. CM is expensive because it entails the provision of services from experts, often as a one-on-one healthcare service. Human resources and time are needed to produce outcomes. Therefore, it is critical that case managers have methods that use EBP to formulate the correct configurations and amounts of their intervention activities to ensure that targeted outcomes are achieved. Financial imperatives compel case managers to look at what activities they are doing or not doing: too little or too much of a "dose" of CM may go beyond a failure to produce the desired effects on outcomes, to wasting resources nonproductively, or even producing harmful outcomes (Huber et al., 2001). Indeed, case managers need to know "which intervention components, at which dosage, under what circumstances, and with which clients, result in which outcomes" (Sidani & Braden, 1998, p. vii).

The selection of the CM activities, as well as their sequencing and timing, is generally within the discretion of the individual case manager's judgment. While some activities occur early in the timing of interventions, others occur over time or late in the delivery of intervention activities. In addition, activities may vary both in amount and in frequency over time. Dosage determination is done to reveal both the array of specific CM activities and their timing. It goes beyond measuring CM as an hour of service delivery to become more precise and descriptive. By describing the dosage of a CM intervention, the activities actually delivered can be characterized more precisely and concretely, usually taking the form of provider actions combined in unique time-and-intensity sessions such as discrete doses of intensity over specific durations of time (Huber et al., 2001).

The dose of a CM intervention includes a variety of discrete, specific activities that may be delivered simultaneously, individually, or in sequence. The variety of actions that may be selected, plus the variation in how they may be timed, contributes to the complexity of measuring and formulating dosage. For example, the measurement of dosage starts with a description. Huber et al. (2001, 2003) first captured and analyzed the specific activities and interventions that were part of case managers' work in substance abuse treatment to more precisely describe what CM was. Next, researchers used the Huber-Hall Dosage framework, consisting of the four elements outlined earlier, to analyze activities and found that defining dosages by amount, frequency, duration, and breadth provided clarity and definition useful in both practice and outcomes analysis. In this population, CM needed to be "front loaded," meaning that cases required heavier dosages of CM activities at the start of treatment. However, the study results showed that the heavy dose did not need to be maintained over time. CM activity dosages were reduced in amount, frequency, duration, and breath as the cases neared the 1-year completion mark.

By measuring these four elements of interventions, case managers can construct profiles of their actual practice activities, anchor them to financial and other value-related measures through reproducible evidence trails, and connect these to predictable outcomes. This orientation differs from the typical CM process. Rather than a focus on achieving CM through a stepwise process, the dosage approach integrates activities with the processes of CM. The synchronization of activity with process into prescribed doses simplifies the complexity of the components of CM interventions and augments the evaluation of CM interventions toward clinical, functional, satisfaction, and financial outcomes.

Acuity

Defined as severity of illness or client condition that indicates the need for the intensity of the subsequent CM intervention (Craig, 2005; Huber, 2006), *acuity* links duration, quality, quantity, and volume to constitute pivotal aspects of the service delivery platforms of healthcare providers, especially CMS. CMS need to measure their clients' needs for care provision and match these client requirements more precisely with the activities CMS subsequently perform. Serving as proxy for time and extent of activities that care CMS should plan to undertake, acuity scores have become integrated into workload systems to determine staffing (Prescott & Soeken, 1996). Acuity represents the level of complexity or difficulty of a CM case in its three primary domains of CM activity: client need-severity, CM intervention-intensity, and healthcare service delivery responsiveness.

Intensity is a term related to acuity that represents both the amount of care and the complexity of care needed by patients or clients. Prescott (1991) identified four major dimensions to intensity: severity

Using one-dimensional counts or case numbers fails to portray complexity. Cases gain a second dimension of weight by assigning acuity values to elements of CM complexity within cases.

of illness, client dependency, complexity, and time. CM acuity relates the intensity of CM interventions to the degree of severity of clients' needs for healthcare services in three broad practice areas—situation, satisfaction, and service (Craig, 2005). Using one-dimensional counts or case numbers fails to portray complexity. Cases gain a second dimension of weight by assigning acuity values to elements of CM complexity within cases. Acuity distinctions set up means whereby CM can be measured in its spheres of activity, intensity of interventions, and extent of success.

Dosage and acuity concepts arose in two different CM practice settings; both prompted by the need to capture and measure CM practice complexity. They emerged as conceptual frameworks that promote greater precision in measuring evidence-based CM practice. One innovative CM practice project, the Acuity Tools initiative (Craig, 2005), is presented in these three articles to demonstrate the use of acuity and dosage concepts in an outcomes analysis format. Details of the project's conception and development phases are featured as a model of translating evidence into a CM business application.

Acuity Tools Project Exemplar

Craig originated the Acuity Tools Project, including the CM Acuity Tool© and AccuDiff© instruments, in 1999 in response to the business imperative to more precisely capture the evidence base of CM activities and more reliably measure CM outcomes (Craig, 2005). These two tools and their accompanying processes were developed as user-friendly devices to monitor changes in four outcomes domains: clinical, functional, satisfaction, and financial. The CM Acuity Tool© was conceived of as a way to capture CM impact created through targeted interventions and then to relate CM interventions to improved outcomes. Arising from frontline CM practice in one large, national telephonic CM company, it was designed to validate CM effectiveness by first assigning complexity values, called *acuities*, and then by measuring changes in the complexity values as subsequent CM interventions were applied. Although reproducibly demonstrating measurable CM impact was the primary outcomes objective, the project sought to accomplish the following aims as well: incorporate core CM criteria, quantify and qualify care needs accurately, report interventions systematically, and evaluate performance objectively.

Acuity Tools Development

Development of the acuity tools began with a literature search to uncover available outcomes instruments. None were found that provided an integrated system to produce evidence of best clinical practice, product efficacy, and financial results. Through surveys internal to the CM practice environment, Craig discovered that there was a gap between available CM data and CM practice demands, including demonstrating value. A need existed to develop an instrument to assign and measure case acuity specific to CM activities. The resulting gap analysis, displayed in Table 1, indicated that there were five practice demands to be addressed and revealed the corresponding gaps to be filled. Specifically, for a tool to be developed and successful for CM, it had to bridge the identified gaps by providing content that:

1. represented the core essentials of CM practice correctly;
2. portrayed features of both clients and CM accurately;
3. functioned reliably;

TABLE 1
Gap Analysis

Practice Demands		Components of CM Outcomes Gap
Correct CM essentials	→	Accurate capture of CM core criteria
True portraits of clients and of CM	→	Augment best practice imperatives
Functional and reliable tool	→	Adapt to alternate functional paradigms
Quick, small effort; big payoff	→	Accommodate practice needs
Objective evaluation of CM impact	→	Advance objective outcomes measures

Note. Development of the acuity instruments for case management (CM) sought to fill the outcomes gaps related to the five practice demands. The demands were identified and pursued in initial investigations of literature sources and available tools.

4. presented a large incentive (payoff) for use while remaining quick and easy to actually use; and,
5. evaluated the impact of CM interventions objectively.

Components of the Acuity Tools Project are described and displayed here in abbreviated form. Full description and permission to use are available from Craig.

CM Acuity Tool© Design

The CM Acuity Tool© is a master conceptual framework in three dimensions that synthesizes key components of CM practice. One of the valuable aspects of the tool is that it categorizes the variables that drive CM complexity into three levels that are from global to discrete. Table 2 displays the CM Acuity Tool© as a map of three core elements that are identified as central to CM practice: (1) indicators, (2) drivers, and (3) subdrivers.

Indicators

The broadest, most inclusive category of the elements in the CM Acuity Tool© is indicators. Derived from the clinical, satisfaction, and business aspects that span all CM activities, the CM Acuity Tool© groups the items that drive CM complexity, called *drivers* and *subdrivers*, into three broad indicator domains that synthesize the overarching CM aspects. As shown in Table 2, the three indicators take the form of CM Acuity Tool© column headings with the following domains:

1. Clinical/Nursing (CN) indicators—Symptom and situation severity assessment
2. Psychosocial/Caregiver (PS) indicators—Satisfaction with and adherence to plan
3. Quality/Cost (QC) indicators—Resource utility intensity and provider cooperation

Indicator categories were synthesized from two main sources. The first source is the 1997 American Nurses Association Nursing Practice Congress' list of seven categories of non–hospital practice (Mastal, 2000). These categories are symptom severity, level of functioning, therapeutic alliance, service utilization, client satisfaction, risk reduction, and protective factors. The second source is from the Commission for Case Manager Certification (CCMC). This CM certification body has identified essential CM activities and promulgated core CM principles. The CCMC (2006) outlined the essential activities of CM as assessment, planning, implementation, coordination, monitoring, and evaluation. Outcomes tracking is added to these well-known CM activities. The CCMC clustered core components of CM into six global categories:

1. CM concepts,
2. CM principles and strategies,
3. psychosocial and support systems,
4. healthcare management and delivery,
5. healthcare reimbursement, and
6. vocational concepts and strategies.

The core principles are stated in full in the CCMC Code of Professional Conduct for Case Managers (CCMC, 2005).

Drivers

The CM Acuity Tool© displayed in Table 2 is made up of indicators, drivers, and subdrivers. Under the column headings, called *indicators*, because they indicate the three large areas (domains) of CM activities, there are items known as drivers. *Drivers* (Table 2, italicized items) connect the broad indicator domains to the pinpoint items of CM interventions called subdrivers. The driver/subdriver combinations describe the combined severity of the client's needs and intensity of the case manager's interventions. As the complexity goes up or down, the acuity score rises or falls in a corresponding manner. Therefore, drivers and subdrivers "drive" the degree of CM acuity up or down (Pink & Bolley, 1994).

Drivers organize subdrivers into similar groups and form a bridge between the sets of subdrivers and the three columns of indicators. As the drivers repeat down each indicator column in the four boxes, they remain static and do not change. The three drivers that repeat in the *CN indicator* column are (1) physical status, (2) primary symptoms, and (3) secondary or comorbid symptoms. The column of *PS indicators* contains drivers relating to (1) patient status, (2) family/caregiver, and (3) satisfaction (client/caregiver adherence). The *QC indicator* column contains drivers pertaining to (1) care delivery (provider adherence), (2) care environment, and (3) facility/provider/customer elements.

Drivers: Case Example

As an illustration, a CM client comes to a case manager with many needs and several issues that are the most predominant problems to be resolved. For example, three main problems might be:

- uncontrolled pain issues resulting from a terminal illness and its end-of-life changes,
- unstable family and caregiver issues relating to palliative arrangements, and
- family doctor and oncologist disagreements about who is to take responsibility for writing orders and making care setting or placement referrals.

In this case, the case manager can use the CM Acuity Tool© to locate the highest and best match of

TABLE 2
The Case Management Acuity Tool©

Clinical/Nursing Indicators	Psychosocial Caregiver Indicators	Quality & Cost Indicators
CN1 1) *Physical status [-or Consent pending]* – Active; able to do all/most age-adjusted acts – Optimal capacity compared to baseline 2) *Symptoms (primary)* – Absent or well-controlled; none problematic – No physician review required 3) *Symptoms (co-morbidity)* – Absent or well-controlled – No problematic symptoms – Uncomplicated death possible	**PS1** 1) *Patient status* – Fully cooperative & adherent to treatment plan – No delay in cooperation or in obtaining consent 2) *Family/Caregiver* – Functional, with coping mechanisms intact – Supportive 3) *Satisfaction* – Large degree of satisfaction with care solutions – Few dissatisfactions & readily solvable	**QC1** 1) *Care delivery* – Plan established/maintained with 1–5 calls & efforts – Very good cost range; no unnecessary care 2) *Care environment* – Setting & intensity very effective, appropriate – Safe and stable; CM minimal or no supervision needed 3) *Facility/Provider/Customer* – Par* [or non-par* with the following] – Fully cooperative with team management approach – Prospective & proactive problem solving of needs
CN2 1) *Physical status* – Slight restriction to age-appropriate activities – Slight impairment compared to baseline 2) *Symptoms (primary)* – Some signs & symptoms present – Minor interventions – Physician review required; care plans concur 3) *Symptoms (co-morbidity)* – Present but little consequence – Prognosis-appropriate death possible; few interventions required	**PS2** 1) *Patient status* – Mostly cooperative & adhering to plan well – Capable of cooperation & giving/getting consent 2) *Family/Caregiver* – Stressed capacity to function – Increasing demands on patient/support system – Coping mechanisms, potential for breakdown – Able to cope with minimal support augmentation 3) *Satisfaction* – Moderate degree of satisfaction with solutions – Dissatisfactions, acceptable time-work to solve	**QC2** 1) *Care delivery* – 6–10 calls & efforts to establish/maintain care plan – Good cost range; little excessive or unnecessary 2) *Care environment* – Setting & intensity mostly effective & appropriate – Capable of improvement in acceptable times & ways – CM of safe setting but changed/changing w/in 7days 3) *Facility/Provider/Customer* – Non-par* [or par with the following] – Mostly cooperative with team management – Good but mostly reactive problem solving
CN3 1) *Physical status* – Limited capablity of age-adjusted self care – Moderate to significant limits versus baseline 2) *Symptoms (primary)* – Impacts ability to perform life activities – Frequent clinical/nursing interventions needed – Physician review required; care plans differ	**PS3** 1) *Patient status* – Minimally cooperative or little plan adherence – Difficulty in participating; delay getting consent 2) *Family/Caregiver* – Compromised capacity to function – Excessive demands on support system – Respite or change in caregivers may be needed	**QC3** 1) *Care delivery* – 11-15 calls & efforts to establish/maintain plan – Fair costs; high probability of unnecessary care 2) *Care environment* [can be 1st 2nd or 3rd one] – Setting & intensity fairly effective, appropriate – Much CM intervention required to improve conditions – Intervention within 3 days for safety &/or stability

(*Continues*)

TABLE 2
The Case Management Acuity Tool© (*Continued*)

Clinical/Nursing Indicators	Psychosocial Caregiver Indicators	Quality & Cost Indicators
3) *Symptoms (co-morbidity)* – Present with destabilizing consequence – Complicated death (re-hospitalization) possible	– Coping mechanisms breaking down or worsening 3) *Satisfaction* – Little degree of satisfaction with care solutions – Dissatisfactions, much time-work to improve	3) *Facility/Provider/Customer* – Non-par[a] [or par with the following] – Poor cooperation with team management approach – Poor problem-solving or accommodation of needs
CN4 1) *Physical status* – Very limited age-adjusted activity level – Unable to accomplish self care compared to baseline 2) *Symptoms (primary)* – Very ill & severe disability; high-risk disorder –1 Hospitalization or intensive clinical/nursing – Physician review required; care plan problems 3) *Symptoms (co-morbidity)* – Present with significant consequence – Unanticipated or very complicated death – Dissatisfactions w/ few solutions & much time	**PS4** 1) *Patient status* – Frankly uncooperative and non-adherent to plan – Unable to participate or to give/obtain consent 2) *Family/Caregiver* – Dysfunctional or no caregivers/placement found – Excessive demands on support system – Respite or change in caregivers required – Coping skills, ineffective; severe breakdown 3) *Satisfaction* – Frank dissatisfaction with care solutions	**QC4** 1) *Care delivery* – 16 or more calls & efforts to establish/maintain plan – Excessive costs; frankly unnecessary care 2) *Care environment* [can be 1st 2nd or 3rd one] – Current setting & intensity ineffective/inappropriate – Many, immediate interventions -or- on-site required – Complex CM maintained to avoid unsafe/unstable 3) *Facility/Provider/Customer* – Non-par[a] [or par with the following] – Non-cooperation with team management approach – Lacks problem solving or accommodation to needs

Note. The chart used to assign levels of acuity in case management (CM) cases contains three elements: indicators, drivers, and subdrivers. Indicators are arranged in three columns with four boxes per column. Drivers are specific to each indicator column (domain) and repeat within the boxes but remain static. From the top to the bottom of each column, subdriver elements increase in characteristics such as quality, quantity, frequency, duration, degree, severity, and intensity. The driver/subdriver combinations are used to relate client need-severity to CM intervention-intensity and signify the levels of complexity within CM cases in the form of acuity scores. Copyright acknowledgments: Intracorp 1999. Based on originator's (K. D. Craig, MS) and corporate copyright (1999). Address reprint requests to: CIGNA PR Dept; 2 Liberty Plaza, Chestnut Street; Philadelphia, PA 19201.
[a]Par/nonpar = provider, participating/not participating.

subdrivers for this client's three main issues that are driving the acuity. To score the pain symptoms or death issues, the case manager would go to the CN indicators column where both comorbid symptoms and death issues can be found, specifically under Driver #3, "Symptoms (comorbidity)." Depending on the severity of the pain or death issues, the case manager would choose the most severe need that is driving the case's complexity, either box CN3 or box CN4. Regarding the caregiver issues, located under the PC indicators column, the case manager will find that Driver #2 "Family/caregiver" provides different degrees of coping success and should choose box PS2, PS3, or PS4, whichever best represents the most accurate and most severe conditions known to exist for this client. Doctor and facility issues reside in the QC indicators column. The case manager would choose the driver and subdriver that best describes the most complex interventions needed to address the physician and setting difficulties, probably QC2, QC3, or QC4. Although Driver #1 "Care delivery" indicates the number of calls the case manager must make or cost issues, Driver #2 describes "care environment" and Driver #3 shows degrees of issues related to "facility/provider/customer." Customer in the original Acuity Project context relates to the corporate customer with whom the company contracts for service delivery.

Subdrivers

Subdrivers are the elements that most closely describe the specific factors that generate complexity within a CM case. Indeed, subdrivers pinpoint discrete factors of complexity within different CM cases. The complexity factors that subdrivers represent arise from several main spheres, such as CM activities to improve an individual client's clinical situation and the delivery environment of the care the client is receiving. Also, subdriver items characterize the specific model (type) of CM being practiced. For example, the practice model under which the CM Acuity Tool© began is CM delivered telephonically on a national scale under contract stipulations from corporate clients. Other CM delivery systems could be a regional community program with direct in-home client assessments or a military CM model with base-specific and facility-specific components. The QC indicators column would be adapted to capture the interventions specific to the type of delivery system used and the elements (subdrivers) that describe the degrees of severity, intensity, and complexity that exist within that system.

As seen in Table 2, subdrivers, like drivers, recur within the three columns of indicators. However, while drivers repeat and remain static, the content of the subdrivers changes within the four boxes. From top to bottom of each indicator column, the subdrivers change in character and drive the level of complexity of a case. Subdriver elements increase in levels of difficulty, quality, quantity, satisfaction, adherence, or severity in the following grades:

1. Low complexity: CN1, PS1, QC1 (first cell, top of each column)
2. Mild complexity: CN2, PS2, QC2 (second cell)
3. Moderate complexity: CN3, PS3, QC3 (third cell)
4. Severe complexity: CN4, PS4, QC4 (fourth cell, bottom of each column).

Subdrivers in CN1, PS1, and QC1 are low in severity with respect to client baseline, in intensity of CM interventions required, and in overall case complexity. CN2, PS2, and QC2 subdrivers are incrementally more severe, intense, and complex, but still mild. CN3, PS3, and QC3 subdrivers are moderate in degree, frequency, quality, or quantity. CN4, PS4, and QC4 subdrivers are the most pronounced in severity, intensity, and overall complexity. Figure 1 displays a flowchart that illustrates the architecture and inner layout of the CM Acuity Tool©.

Acuity Scoring

An acuity score is calculated in five easy steps using the instrument displayed in Table 2 and the scoring algorithm presented in Table 3 (Craig, 2006). Under the directions for use of the CM Acuity Tool© presented in the table, the case manager documents three driver/subdriver selections, an interim sum, and the case acuity score.

When case managers apply the CM Acuity Tool© to different clients' cases, many combinations of driver/subdriver choices are possible, depending on the causes of complexity that are present in each client's situation. They vary by amount, time, and duration, that is, by dosage. Therefore, different driver/subdriver combinations represent the different elements that reflect complexity, and these combinations generate different interim sums and acuity values. An interim

> *The measurements facilitate comparisons of commonalities within and between case managers' cases and caseloads as well as across time, diagnoses, and geographic distances. Such data are useful for internal quality and cost evaluations and for meeting accreditation and regulation requirements.*

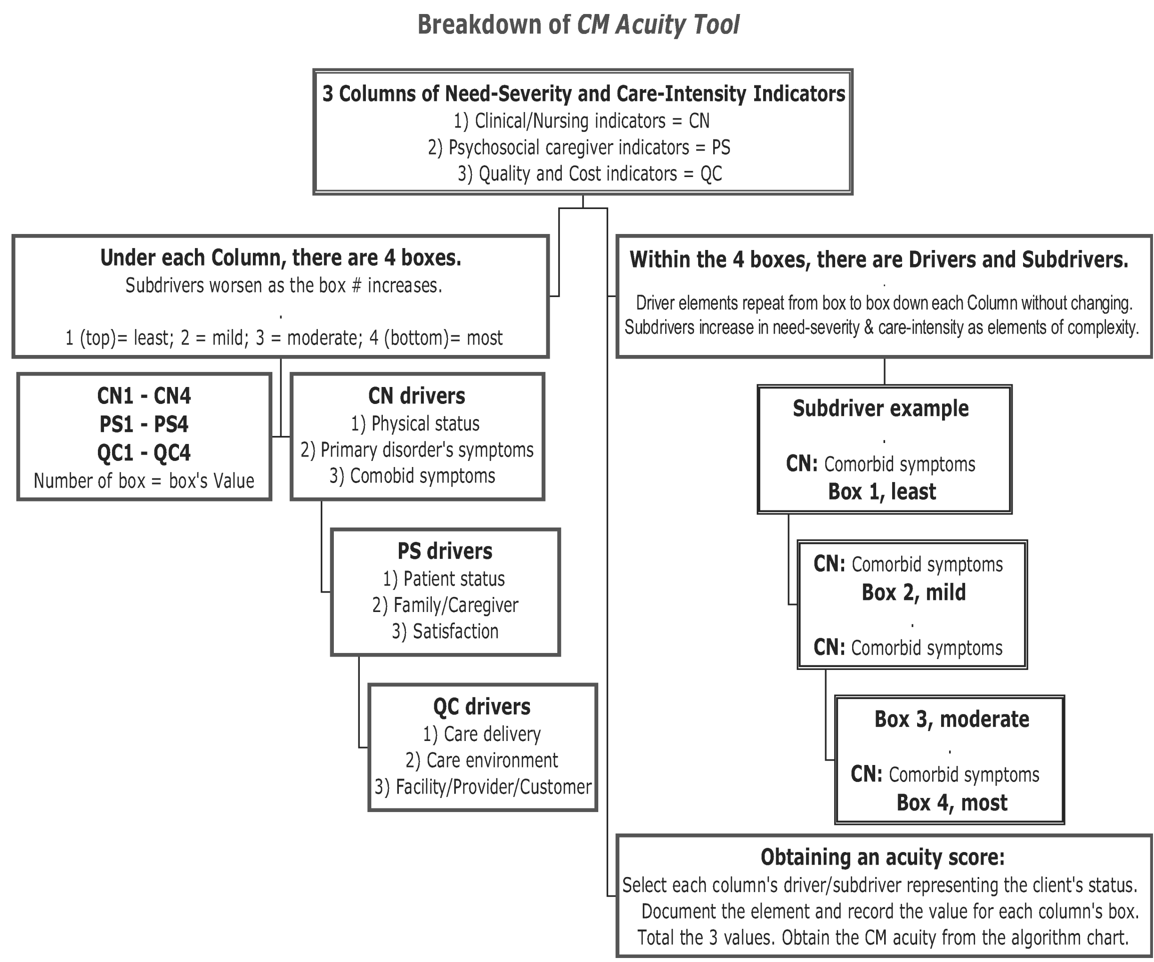

FIGURE 1
Acuity flowchart. The CM Acuity Tool© has three columns of indicators with four boxes (cells) containing both drivers that remain constant for each column and subdrivers that increase in severity and intensity for each column.

sum, which falls between 3 and 12, is mapped to a true acuity score that has values from 1 to 5, by using a custom-designed algorithm such as the one shown in Table 3.

The varying choices of severities afford case managers the ability to scale and score levels of care intensities at particular times in the course of CM service delivery. Scales based on elements of CM complexity, which have been tested for concordance (Fisher & van Belle, 1993), generate reproducible footprints of practice (evidence) and permit outcomes to be recorded, measured, and compared. The measurements facilitate comparisons of commonalities within and between case managers' cases and caseloads as well as across time, diagnoses, and geographic distances. Such data are useful for internal quality and cost evaluations and for meeting accreditation and regulation requirements.

Subdrivers: Case Example

In the previous example where a CM client with uncontrolled pain issues resulting from a terminal illness, unstable caregiver issues relating to end-of-life arrangements, and physician disagreements about orders and placement referrals has come to a case manager, the CM Acuity Tool© can be used to score a case's acuity. As described earlier, the case manager would locate the different subdriver elements that best describe the most complex issues occurring in this case. The case manager should choose the subdriver that is the most complex item she or he is dealing with on behalf of the client.

If the case manager were to choose CN4, Driver #3 "Comorbid" symptoms, the subdriver could be either "present with significant consequences" or "very complicated death." If PS3 and Driver #2 were chosen, the subdriver might best be "family/caregiver coping mechanisms breaking down or worsening." In QC4, the driver might be #1 "Care delivery" and "the number of calls the case manager needs to make" or Driver #3 "Facility/provider/customer" because of the subdriver "noncooperation" or "lack of accommodation to (client's) needs." When the decision is made, the case manager records the choices in

TABLE 3
Directions for Using the CM Acuity Tool©

Directions for using CM Acuity Tool© indicators, drivers, and subdrivers and how to use the algorithm to determine case acuity:

1. Select box's driver/subdriver combination that best fits from Columns 1, 2, and 3.
2. Add three values (one box value from each indicator column) to derive an acuity sum.
3. Locate the acuity sum in the algorithm chart below. Determine the "case acuity."
4. Record the case acuity value in specified numeric data field.* (*Specific to workflow.)
5. Document driver choices and case acuity in assessment narrative (i.e., A of SOAP).
6. Perform and date case acuity in each case at least twice—at commencing, at closing.
7. Revise, date, and document case acuity when significant change in health status occurs.

Acuity sum	Alpha level	Case acuity
3 or 4	Basic = B	1
5 or 6	Good = G	2
7 or 8	Fair = F	3
9 or 10	Poor = P	4
11 or 12	Worst = W	5

Note. Steps 1 through 3 direct case managers on how to use the CM Acuity Tool© to obtain an acuity sum and convert the sum to a case acuity score. Steps 4 and 5 indicate the mechanism for recording the score for reports to be run and documenting the acuity findings in the case narrative. Steps 6 and 7 discuss when to perform the acuity scoring.

the case narrative like this: CN4/3 complicated death; PS3/2 coping mechanisms breaking down; QC4/3 physician noncooperation = 4 + 3 + 4 = 11. Therefore, the acuity sum is 11. However, it is important to note that this score is not the case acuity. The case acuity score is found by using the conversion chart (algorithm) given in Table 3. Eleven as an acuity sum converts to a case acuity of 5, the highest case acuity. The completed chart notation would appear like this: CN4/3 complicated death; PS3/2 coping mechanisms breaking down; QC4/3 physician noncooperation = 4 + 3 + 4 = 11; case acuity = 5.

ACUITIES: FROM EVIDENCE TO OUTCOMES

Case acuity measurement permits rigorous examination of CM practice and lends itself to systematic research (Davies & Logan, 1999) using evidence-based factors related to CM practice through research techniques such as blinding, cohort, retrospective, prospective, and longitudinal studies (Fisher & van Belle, 1993). The footprints of practice found in dosage and acuity data analysis provide traceable evidence of case severity and CM intensity in the form of complexity identification. Enrichment of CM intervention concepts is achieved as well by applying the dosage framework of CM activity prescription. Assigning complexity distinctions to cases based on core CM content sets up a pivotal source of outcomes tracking—the acuity differential—which is specific to the activities and actions of case managers.

THE BUSINESS CASE FOR CASE MANAGEMENT

CM is a more complex healthcare provider intervention than was originally thought. Multiple disciplines deliver CM services in a wide variety of service settings (Huber, 2000). As a result, the activities of CM practice vary and remain difficult to standardize (Tahan, Huber, & Downey, 2006). Attempts to measure and describe CM include the use of single outcomes variables such as a case count or service cost (e.g., 1 hr of a case manager's time) and mathematical projections such as the business parameter of return on investment (ROI). Inconsistent results across provider settings and focal populations have been reported regarding CM's ability, or inability, to save money. The quandary remains: What is the best way to capture, measure, and calculate the value of CM?

Although business decision makers recognize that CM is important to client satisfaction, some are tempted to say that CM is elusive and that its worth is ephemeral and not reducible to outcomes measurement. However, the educational psychologist Thorndike (1918, p. 16) said: "Whatever exists at all exists in some amount," and therefore can be measured. Thus, case managers are challenged to "prove our worth," and part of the challenge is to discover how sophisticated the measurements of CM must be (Mastal, 2000). At this time, when it is important to make the business case for sustaining CM practice within healthcare organizations, the complexity of CM has so far impeded its accurate measurement.

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Some have called CM the hope of the healthcare industry because of its ability to coordinate care and drive efficiency.

CM was reinvented in the 1990s and attained its current position of importance as an advanced practice of healthcare providers using specialized interventions targeted to the coordination of care across the healthcare continuum. It has continued to evolve as a respected and essential professional healthcare service. Some have called CM the hope of the healthcare industry because of its ability to coordinate care and drive efficiency (Georgiou, 2005). In answering the call for clear, decisive, and demonstrative evidence of effectiveness, case managers have begun to produce strategies that verify the beneficial effects case managers have on their clients' healthcare experiences, on the broader healthcare system, and on the economic bottom line.

Differences of purpose exist between the business and practice aspects of healthcare. Business managers say, "show me the money"; healthcare providers focus on "achieve outcomes." Business proof refers to analyzing results with dollars attached, such as averted emergency department visits, reduced bed days, and money saved on treatments (Vann, 2006). From a business perspective, the CM outcomes portfolio includes metrics such as hours billed, savings realized, cost-benefit analysis (CBA) data, and ROI (Cesta & Tahan, 2003). Finance-based CBA connects short-term monetary outlay with longer term good. ROI involves a complicated equation of terms such as overt costs, hidden expenses, invested revenues, and side effect aversions (Goetzel, Ozminkowski, Villagra, & Duffy, 2005). However, in providing needed services and advocating for clients, healthcare providers, especially CMS, focus on outcome factors that are harder to tie to dollars, such as quality and satisfaction (Lurie & Sox, 1999).

Adapted from Aristotle's definition of ethical treatment (Ross, 1925), *case managers' five rights* encompass the practice obligations of accomplishing the *right* intervention in the *right* measure at the

Differences of purpose exist between the business and practice aspects of healthcare. Business managers say, "show me the money"; healthcare providers focus on "achieve outcomes."

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right time to the *right* person in the *right* setting. Acuity and dosage enhance the CM five rights by defining the right hash marks on the right scales, which then promotes the accurate assignment and assessment of CM interventions.

The evidence-based approach to making a business case for CM presented here takes a fresh look at proving worth by concentrating on dosage and acuity aspects of CM practice. These two concepts are measured at the discrete level, yielding greater specificity than do more global measures of provider interventions. Dosage assists CM providers to more fully describe the multidimensional characteristics of each healthcare intervention (Huber et al., 2001, 2003). After a healthcare intervention is fully described, it is then more easily evaluated from standpoints of both research and business outcomes. Description and specification of the dose of CM activities leads to more accurate measurement, which provides evidence that leads to a CM intervention being assessed for achievement of the results predicted, facilitates CM dosage analysis, and, ultimately, can lead to activity prescriptions designed to produce predictable results. A more precise description of the dosage of an intervention fleshes out the linkage of acuity to interventions.

Conclusion

In business language, CM interventions corresponding to prescribed dosages of CM practice result in outcomes that can be predicted and replicated. In practical application, the acuity concept associates severity of clients' illnesses (or situations) to intensity of CM interventions or responses (Craig, 2005). Together, dosage and acuity offer the CM outcomes portfolio useful and effective instruments for case managers to measure the worth of their practice. In Parts II and III of this series, the Acuity Tools Project is presented in greater depth. The two measurement instruments, CM Acuity Tool© and AccuDiff©, are described and discussed. Their purposes of improving communications regarding the dimensions of CM practice and making the business case for CM

practice by valid measurements of specific components of CM are explained. Part III explains how to apply the acuity instruments in CM practice to make comparisons between CM cases that enable quality improvements and outcomes tracking despite the complexity found in CM.

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APPENDIX
Definitions Used in the Article

Term	Acuity Tool© Definition
Acuity, CM acuity	Measure of complexity in a CM case based on (1) severity (below) of illness or client condition (need-severity) and (2) intensity (below) of the subsequent CM response or intervention (intervention-intensity, below)
Acuity Tool©, drivers	Factors that link the high-level indicators (below) to the discrete-level subdrivers that pinpoint the elements of CM activities. In the CM Acuity Tool© (Table 2), three sets of drivers are specific to each of the three columns of indicators and repeat in an unchanging way within the four boxes (cells) within each column.
Acuity Tool©, indicators	Items that point to or indicate certain conditions. In the Acuity Tools Project, indicators are broad, high-level categories of influence derived from the clinical, satisfaction, and business aspects that span all CM activities. In the CM Acuity Tool© (Table 2), three broad domains of indicators are Clinical/Nursing indicators, Psychosocial/Caregiver indicators, and Quality(Cost indicators.
Acuity Tool©, subdrivers	Elements that pinpoint the specific factors generating complexity in a CM case. In the CM Acuity Tool© (Table 2), subdrivers specific to each of the three columns of indicators (above) and grouped by drivers (above) repeat within the four boxes (cells) but change in degree, extent, amount, frequency, quality, or quantity from the top to the bottom of each column.
Complexity, CM	Characteristic representing the acuity (above) or level of difficulty of a CM case. Complexity involves several CM domains (below) including severity (below) of a client's needs, intensity (below) of CM interventions, dosage (below) of prescribed CM activities, as well as conditions of a healthcare delivery setting or those delivering the care.
Domain, CM	Scope, sphere, area, or extent of influence or activity of a unified or related field, topic, category, or subject. In CM Acuity Tool(©, three domains of CM influence are called indicators (below).
Dosage, CM intervention dose	Concept representing actual activities used in a CM intervention prescribed by amount, frequency, duration, and breadth (Huber-Hall Dosage Model). Unique combination of provider (case manager) actions at a specific level of intensity (below) over a discrete duration of time prescribed to achieve a known and predictable response.
Drivers	See acuity, CM, drivers, above.
Exemplar	Example serving as a concept or model worthy of imitation.
Intensity, CM intervention-intensity	Characteristic representing a level, degree, extent, amount, frequency, quality, or quantity of case manager's response to client need-severity (below) or appropriateness of healthcare delivery. Intensity of CM interventions (intervention-intensity) is a pivotal dimension of dosage (above) and the CM Acuity Tool©.
Isostatic differential	See acuity, isostatic acuity, isostatic differential, above.
Need-severity	See severity, CM, need-severity, below
Severity, CM need-severity	Characteristic representing the effects of a CM client's illness, degree of ability to function, or status of conditions that serve to alter the level of complexity of a CM case. Need-severity is one pivotal dimension of the CM Acuity Tool(c).
Subdrivers	See acuity, CM, subdrivers, above.
Tests and analyses definitions	
Beta (β) testing, β-test phase	Stage in the testing of a new process or product before release beyond the small group of initial testers. Phase when a new process or product is tested for real-world exposure by a small number of users, other than its developers. After a β-test, testing may advance to the "pilot-test phase" in which the process or product may be "piloted" or used by a "pilot group" that is larger and more diverse and usually of a longer duration than the β-test phase. In both phases, data are collected, reported, and analyzed and changes to the process or product are recorded and tracked systematically and diligently.
Concordance	Statistical evaluation that measures or ranks the amount of agreement among sets of items compared two at a time.
Cross-validation test	Statistical test that evaluates the ability of a test or model to accurately predict (validate) occurrences between uses within a test population (cross-validate) or from test samples to real-world applications (cross-validate).
Gap analysis	Organized study of the differences (gap) between what is desired and what exists in current or real-world practice.
Interrater reliability (IRR) test, random, blinded IRR tests	Statistical test that measures the amount of agreement between different users (raters) who do not know the answers other raters are or have provided (blinded). If the IRR is high, the test can be relied on to provide similar results (reliability), even though given to many different users in a disorganized (random) manner.