CE 1.5 ANCC Contact Hours

Professional Case Management
Vol. 23, No. 3, 130-138

An Acuity Tool for Heart Failure Case Management

Quantifying Workload, Service Utilization, and Disease Severity

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ABSTRACT

Purpose: The cardiology service line director at a health maintenance organization (HMO) in Washington State required a valid, reliable, and practical means for measuring workloads and other productivity factors for six heart failure (HF) registered nurse case managers located across three geographical regions. The Kilgore Heart Failure Case Management (KHFCM) Acuity Tool© was systematically designed, developed, and validated to measure workload as a dependent function of the number of heart failure case management (HFCM) services rendered and the duration of times spent on various care duties.

Primary Practice Setting: Research and development occurred at various HMO-affiliated internal medicine and cardiology offices throughout Western Washington. The concepts, methods, and principles used to develop the KHFCM Acuity Tool© are applicable for any type of health care professional aiming to quantify workload using a high-quality objective tool. The content matter, scaling, and language on the KHFCM Acuity Tool© are specific to HFCM settings.

Methodology and Sample: The content matter and numeric scales for the KHFCM Acuity Tool© were developed and validated using a mixed-method *participant action research* method applied to a group of six outpatient HF case managers and their respective caseloads. The *participant action research* method was selected, because the application of this method requires research participants to become directly involved in the diagnosis of research problems, the planning and execution of actions taken to address those problems, and the implementation of progressive strategies throughout the course of the study, as necessary, to produce the most credible and practical practice improvements (I. Chein, S. W. Cook, & J. Harding, 1948; J. Collier, 1945; K. Lewin, 1946; H. J. Streubert & D. R. Carpenter, 1999). Heart failure case managers served clients with New York Heart Association Functional Class III–IV HF (American Heart Association, 2017), and encounters were conducted primarily by telephone or in-office consultation.

Results: A mix of qualitative and quantitative results demonstrated a variety of quality improvement outcomes achieved by the design and practice application of the KHFCM Acuity Tool©. Quality improvement outcomes included a more valid reflection of encounter times and demonstration of the KHFCM Acuity Tool© as a reliable, practical, credible, and satisfying tool for reflecting HF case manager workloads and HF disease severity.

Implications: The KHFCM Acuity Tool© defines workload simply as a function of the number of HFCM services performed and the duration of time spent on a client encounter. The design of the tool facilitates the measure of workload, service utilization, and HF disease characteristics, independently from the overall measure of acuity, so that differences in individual case manager practice, as well as client characteristics within sites, across sites, and potentially throughout annual seasons, can be demonstrated. Data produced from long-term applications of the KHFCM Acuity Tool©, across all regions, could serve as a driver for establishing systemwide HFCM productivity benchmarks or standards of practice for HF case managers. Data produced from localized applications could serve as a reference for coordinating staffing resources or developing HFCM productivity benchmarks within individual regions or sites.

Key words: *acuity, heart failure, productivity, workload*

The cardiology service line director at a health maintenance organization (HMO) in Washington State required a valid, reliable, and practical means for measuring the workloads of six heart failure (HF) registered nurse case managers located across three geographical regions. The existing productivity benchmark required case managers to maintain a minimum of 75 clients on their panel, but had no inherent means of accounting for caseload

Supplemental digital content is available for this article. Direct URL citation appears in the printed text and is provided in the HTML and PDF versions of this article on the journal's website (www.professionalcasemanagementjournal.com.)

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The author reports no conflicts of interest.

DOI: 10.1097/NCM.0000000000000259

acuity or workload variability. A basic version of an acuity tool, proposed by the former cardiology medical director, had been introduced as a potential means to this end, but no scientific process had been applied for evaluation purposes. Case managers questioned whether the content matter, numerical scales, and scoring methods of the tool provided a fair reflection of their workload. It became clear that further research and development was required before such a tool could be applied to measure workload at a systemwide level.

Literature Review

"Acuity" is a term used to describe the general measurement of a client's disease status and use of health care resources. Acuity accounts for the "duration, quality, quantity, and volume" of health care services relative to a client's needs (Huber & Craig, 2007, p. 134). Various acuity tools have sought to capture the diversity of applied case management services, client characteristics, and outcomes for various caseload populations (Collister, Slauenwhite, Fraser, Swanson, & Fong, 2014; Craig & Flaherty-Quemere, 2009; Craig & Huber, 2007; Ferrant, 2004; Huber & Craig, 2007). The acuity tools have attempted to reduce the complexity of case management into core components that can be scaled, ranked, and quantified. All have relied on the fundamental concept that case management is a finite service applied with the intent of optimizing client outcomes.

The concept of case management dosage was developed by Huber, Hall, and Vaughn (2001), who demonstrated that the administration of case management services could be likened to the administration of pharmaceutical doses of medication. Similar to pharmaceutical doses, case management doses were described as having a specified amount, frequency, duration, and breadth (number of different services offered). This concept was later applied by Huber, Sarrazin, Vaughn, and Hall (2003), who concluded that further research was needed to link the impact of specific case management services and dosages to outcomes on an ongoing as opposed to a static basis.

Huber and Craig (2007) developed the Case Management (CM) Acuity Tool© in an effort to bridge the gap between case management dosages and outcomes. The tool was composed of three categories of indicators, or criteria, which incorporated three main realms of case manager–client interaction. These realms were defined as client need-severity, CM intervention-intensity, and health care service delivery responsiveness. Each of the three indicator categories was subcategorized into four numerically ranked levels of acuity, with Level 1 indicating the least acuity and Level 4 indicating the most acuity. In a follow-up article, Craig and Huber (2007) claimed that outcomes could be demonstrated by calculating the difference in acuity scores over the respective period in which a client received case management services (i.e., weeks, months, or quarters). The authors proposed that the collective dosage of case management services and the associated outcomes could be analyzed to guide a variety of resource management decisions including staffing levels.

Gap Analysis

There was conceived difficulty in applying acuity scores from Huber and Craig's (2007) CM Acuity Tool© to measure outcomes, because the scores are measured across a variety of domains and influenced by a mix of client, caregiver, care setting, and even service utilization characteristics (i.e., number of phone calls). The design of the CM Acuity Tool© captures a broad range of factors that influence acuity across the health care continuum, but it is difficult to conceive how differences in acuity scores could be used as a basis for isolating any specific case manager outcome measurement. In this regard, the tool may work well for measuring acuity, but it lacks the level of specificity required to measure workload.

A similar challenge with design format was discovered for the acuity tool that had been previously introduced into heart failure case management (HFCM) practice. The tool was designed to report an average acuity score on the basis of four parameters that incorporated elements from workload, service utilization, and HF disease severity domains, but the tool provided no practical means of isolating the parameters into their respective domains. Workload or service utilization could not be measured proportionally to HF disease severity without performing a case-by-case analysis. With only four parameters, the tool lacked enough sensitivity to adequately assess workload or any of the other domains independently. It was clear that a new tool needed to be developed, one that could reflect the unique and shared factors influencing case manager workloads within and across sites.

Framework, Behavioral Change Theory, and Methods

Prior to initiating any sort of fixed research process, concepts from the Ottawa Model of Research Use (Graham & Logan, 2004; Logan & Graham, 1998) were applied to assess the microsystem and mesosystem environments (Nelson, Batalden, Godfrey,

& Lazar, 2011). The experiences and observations gained through direct job observation particularly helped to establish a gross appreciation of the HF case managers' role, scope of services, and caseloads. The initial groundwork also established a general sense of the total time required to complete an average encounter. Such understandings helped the primary researcher to develop a general concept of the range of content matter that would need to be included on a high-quality acuity tool.

Concepts from Kotter's Eight-Step Process for contemporary change (Kotter, 1996) were used to assess readiness for change within the culture, establish champions, and ensure a systematic approach for creating long-term behavioral change. Frequent and transparent communication by telephone and e-mail, as well as monthly group meetings between the cardiology service line director, primary researcher, and HF case managers provided a chance for everyone to express thoughts and ideas. The meetings also provided a chance to update the team on short-term victories and challenges, as they arose, throughout the course of the project. For example, the challenge of how to share one's acuity files, between multiple computers, was an early topic requiring further discussion. Transparent communication fostered a sense of team involvement, and case manager motivation seemed to remain fairly high throughout the project. During particularly busy times, it was helpful to reinforce how completing an acuity tool, as a part of daily practice (increased work), could potentially decrease, or redistribute, case manager workloads more evenly upon the completion of the project.

The initial groundwork prompted the selection and application of *participant action research* as a means of vesting case managers into assisting the primary researcher with assessing, diagnosing, understanding, and addressing variables related to the challenges of measuring their workloads in a fair and credible manner. As a general field of research, *participant action research* requires that (a) a problem can be diagnosed within a system (i.e., the challenge of measuring workload) and (b) a client-system infrastructure exists to assist the primary researcher with the diagnosing of factors related to the problem, as well as the planning for how to conquer the problem through a series of proposed actions taken to address it (Chein, Cook, & Harding, 1948; Collier, 1945; Lewin, 1946; Streubert & Carpenter, 1999). The primary goals, in applying a *participant action research* method, were to learn about the unique challenges of measuring case manager workloads, from their direct perspective, and to vest case managers into the design of a quality acuity tool with which they would be more satisfied in applying to their daily practice.

Qualitative Phase

Personal Interviews

Quality concerns about the baseline acuity tool were elicited through anonymous HF case manager interviews that were transcribed and analyzed for content. Similar content was systematically coded according to qualitative analysis principles advanced by Corbin and Strauss (1990). Codes were ranked accordingly on the basis of the percentage of times they were repeated by fellow HF case managers. The rankings revealed the nature and popularity of shared quality concerns for the current acuity tool and pointed out focus areas for improving case manager satisfaction in future developments. To ensure the development of a high-quality acuity tool, all codes on which at least 50% of case managers ($n = 3$) had agreed were regarded as primary concerns that must be addressed in future developments. Codes with at least a 33% agreement rate were regarded as secondary concerns and were further considered only if they supported a primary concern (see Appendix A for the list of codes representing quality concerns for the baseline acuity tool).

Significance

The qualitative phase ultimately revealed certain design aspects of the baseline tool that were unfair or misrepresentative of the HF case managers' work. For example, one interviewee pointed out that "the time on the calls (as scaled on the acuity tool) kind of assumes that less than 10 min is normal. I have almost no calls of that length. They are always much longer." At the conclusion of the qualitative phase, the *participant action research* method had been rooted into the HMO's environment. Case managers had become vested into the prospect of creating a more credible acuity tool and had revealed quality improvement aspects that could be further explored in the next phase.

Quantitative Phase

Quality improvement assertions gathered from the qualitative phase were further validated with quantitative acuity data before being considered for incorporation into future acuity tool developments. For the sake of brevity, the complete research framework was demonstrated only for the "encounter time" parameter, which was subsequently split into the "direct-care time" and "indirect-care time" parameters. The same two-phased approach, consisting of qualitative and quantitative research, was applied to the design process of additional parameters as possible.

The quantitative phase consisted of three subphases. The subphases were entitled as follows: (a) The Acquisition of Baseline Acuity Data, (b) The Creation and Application of the Kilgore Heart Failure Case Management (KHFCM) Acuity Tool©, and (c) The Comparative Analysis. Each subphase was essential to the process.

Subphase 1: The Acquisition of Baseline Acuity Data

Data Acquisition

Baseline acuity tool data were acquired by all participating HF case managers ($N = 6$) on a per-encounter basis for all HFCM clients across all sites from October 3 to October 31, 2016. Acuity scores were recorded in password-protected Microsoft Excel (2010) spreadsheets and e-mailed to the primary researcher over a secure server. Scores were averaged individually by HF case managers and collectively for all HF case managers across all sites. Although HF case manager participation was strictly voluntary and offered no specific benefits, all HF case managers within the HMO ($N = 6$) elected to sign the consent form approved by a human participants review board and participate in the project.

Results

As illustrated in Appendix A, a majority of interviewed case managers (67%) asserted that the "encounter time" parameter on the original acuity tool was scaled too low to represent the time required to fulfill all job duties for a given encounter. As illustrated in Appendix B, only 14 out of 684 total encounters were scored a *1* (2%), 100 were scored a *2* (15%), and by far the vast majority of cases ($n = 570$) were scored a *3* (43%) or *4* (40%). By validating qualitative assertions with quantitative data, an additional layer of verification was added to the quality improvement research process.

Implications

The finding that only 2% of encounters were scored a *1* on the baseline acuity tool confirmed that the minimum encounter time of less than 10 min was too low to account for encounter time in all but a very small percentage of cases. The finding quantitatively supported the HF case managers' assertion that the minimum time needed to be increased in future developments. On the opposite end of the spectrum, the finding that 40% (nearly half) of encounters were scored a *4* on the original acuity tool brought into question the fairness of the maximum time range from the perspective of the HF case manager. A score of *4* reflected all encounters that took greater than 30 min to complete, but it is was unclear whether the encounters took just over 30 min on average or whether they took much longer. The data supported that the maximum time needed to be increased to represent the actual time spent on nearly half (40%) of encounters in a more accurate and fair manner.

Subphase 2: The Creation and Application of the KHFCM Acuity Tool©

Design and Development

A combination of qualitative and quantitative research findings, such as those demonstrated earlier, was applied to the design of the KHFCM Acuity Tool©. The HFCM service utilization and HF disease severity domains from the baseline acuity tool were retained in the KHFCM Acuity Tool© because of their correlation with workload and other potential quality outcomes such as monthly HF readmission rates; however, these domains were isolated from the workload domain, and the specificity of all three domains was increased by the addition of content matter and one new parameter per domain. In total, seven parameters were spread across three domains on the KHFCM Acuity Tool© (See KHFCM Acuity Toolkit Overview, Supplemental Digital Content 1, available at: http://links.lww.com/PCM/A6). The goal was to create a self-contained, yet practical, tool that could measure workloads and gather objective data that could be used to analyze differences in case manager practices and caseloads—both within and across sites. The KHFCM Acuity Tool© was developed in a Microsoft Excel (2010) spreadsheet format. Development occurred between December 2016 and February 2016.

Data Acquisition

With the same methods that had been applied to gather baseline acuity tool data, the KHFCM Acuity Tool© was launched to gather data on all HFCM clients, across all sites, from February 6 to March 6, 2017. Again, all HF case managers ($N = 6$) participated in the data acquisition process.

Results

As illustrated in Appendix B, the vast majority of scores from the KHFCM Acuity Tool© data acquisition period were rated toward the middle of the range as opposed to either end. A *2,* which represented 16–30 min, was the most common score for "direct-care time" and "indirect-care time." Out of all encounters ($N = 682$), 55% ($n = 377$) were scored a *2* for "direct-care time" and 46% ($n = 316$) were scored a *2* for "indirect-care time."

Approximately 27% of encounters ($n = 182$) were scored a *1* for "direct-care time" and 25% ($n = 172$) were scored a *1* for "indirect-care time." On the opposite end of the scale, the data distribution showed that 4% of encounters ($n = 28$) took more

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than 45 min of "direct-care time" and 5% (n = 35) took more than 45 min of "indirect-care time."

Subphase 3: The Comparative Analysis

The data distribution for the KHFCM Acuity Tool© supported the use of 15-min intervals over 10-min intervals for both time parameters. The minimum time increment of 15 min demonstrated enough sensitivity to represent approximately 25%–27% of encounters on the low end of the scale. Although it is possible that some encounters may have taken only a few minutes for either "direct-care time" or "indirect-care time," data from the baseline acuity tool supported that very few encounters (2%) took less than 10 min when both time parameters were still combined into the "encounter time" parameter. Furthermore, only 15% of "encounter time" scores from the baseline tool were a *2*, which demonstrated that, collectively, only 17% of "encounter time" scores reflected a time of 20 min or less whereas 83% reflected a time greater than 20 min. Therefore, it was concluded that with the minimum time increment of 15 min or less for both "direct-care time" and "indirect-care time," the KHFCM Acuity Tool© demonstrated a high enough specificity to avoid overestimation of time to a point that could lead to overstaffing. In this regard, the KHFCM Acuity Tool© was fair to the HMO's administration.

The remaining distribution for the KHFCM Acuity Tool© demonstrated that most encounters were scored in the middle of the scales for both time parameters and that only very few were rated at the maximum end of either scale. A total of 69% of encounters were scored in the middle of the range, as either a *2* or *3*, for both "direct-care time" and "indirect-care time." On the opposite end of scale, the distribution demonstrated that the overall percentage of encounters that were scored a *4* (>45 min) was very low (4%–5%) in comparison to the baseline tool for which 40% of encounters had been scored a *4* (>30 min). With very few encounters having exceeded the scale, it was concluded that the KHFCM Acuity Tool© was a more precise and fair tool for reflecting time spent by HF case managers.

Significance

The quantitative phase ensured that the KHFCM Acuity Tool© had provided a valid representation of HF case manager practice. Applied findings from the quantitative phase helped ensure that the design of the KHFCM Acuity Tool© was data driven and unbiased toward HF case managers or the HMO's administration. Comparative analyses between the baseline acuity data and KHFCM Acuity Tool© data demonstrated objective quality improvement outcomes such as those for the time parameters example. Similar analyses were carried out for the design of additional parameters and content matter as possible.

Additional Measures and Outcomes

Interrater Reliability

At the conclusion of the data acquisition period, all HF case managers (N = 6) applied the KHFCM Acuity Tool© to six fictional case studies on the basis of anonymous HF client encounters. All HF case managers agreed to complete the case studies confidentially so that the interrater reliability of the KHFCM Acuity Tool© could be assessed. Two separate measures of interrater reliability were taken. The first measure was the interrater reliability between the creator of the KHFCM Acuity Tool© and each of the six HF case managers. The results (see Appendix C) demonstrated a mean agreement rate of 82%.

The next measure of interrater reliability was that between all case managers (N = 6), the Krippendorff alpha test was applied on the principles described by Hayes and Krippendorff (2007). The results showed that the alpha value (α = 0.78) for the interrater reliability test was acceptable according to Krippendorff (2012), who described alpha values less than 0.67 as indicative of low interrater reliability and those above 0.80 as indicative of high interrater reliability.

Both measures of interrater reliability supported the KHFCM Acuity Tool© as a reliable instrument. The HF case managers scored parameters as the creator of the tool had intended 82% of the time, and the tool demonstrated an interrater reliability with a statistically significant alpha value (α = 0.78). On the basis of these findings, it was concluded that the data produced by the KHFCM Acuity Tool© had provided a reliable indication of workloads, HFCM service utilization, and HF disease severity within and across sites.

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Practicality

A postproject survey was e-mailed to all participating HF case managers ($N = 6$). Questions included: "Was the KHFCM Acuity Tool© user-friendly?" and "What was the average time spent completing the KHFCM Acuity Tool©?". All but one participant indicated that the KHFCM Acuity Tool© was user-friendly.

There was high variability in the time reported for completing the KHFCM Acuity Tool©. Half of the participants ($n = 3$) indicated an average completion time of 1 min per encounter. Two participants indicated an average completion time of 5 min, and one participant indicated an average completion time of 8 min. The average completion time for participants was 3.5 min. It should be noted that the instillation of software dropdown menus occurred after the conclusion of the trial period and is likely to have decreased the average completion time substantially.

Credibility: HF Case Manager Satisfaction

The postproject survey incorporated questions about the quality of the KHFCM Acuity Tool© including: "Did the chosen content matter on the KHFCM Acuity Tool© provide a fair reflection of the range of HFCM services?" and "Did the chosen content matter on the KHFCM Acuity Tool© provide a fair reflection of the symptoms used to assess HF disease severity?" Four HF case managers (67%) indicated that the tool was reflective of the range of HFCM services, one was undecided, and one replied that tool was unreflective. Upon investigation, it was discovered that the unreflective response was based on a fundamental misunderstanding of how parameters were scored, revealing a need for further clarification and education. Five HF case managers (83%) indicated that the tool provided a fair reflection of HF disease severity and one was undecided.

Limitations

A *participant action research* method (Chein et al., 1948; Collier, 1945; Lewin, 1946, Streubert & Carpenter, 1999) was employed in an effort to vest HF case managers into the design and application of an acuity tool that could measure workload. Although HF case managers were involved in the design and application of the KHFCM Acuity Tool©, only quality improvement outcomes were assessed in the research process. The long-term popularity of the tool and the HF case managers' and cardiology service line director's motivation to apply it to daily practice, as a means of assessing workload, remain yet to be demonstrated.

Although the KHFCM Acuity Tool© measures the HF case managers' client-based workloads, it does not account for professional work such as continuing education, meetings, or job training. In addition, the tool does not account for paid time off or sick leave. Such incidences could obviously affect total monthly workloads and must be considered as applicable.

Conclusions

The primary objective was to design an acuity tool that could measure HF case manager workload. In accordance with the applied *participant action research* method (Chein et al., 1948; Collier, 1945; Lewin, 1946, Streubert & Carpenter, 1999), the research process and objectives evolved slightly, as further challenges with measuring workload were discovered, the assertions of HF case managers were validated, and the interests of administrators were incorporated into the assessment and product design processes. The KHFCM Acuity Tool© was demonstrated to have measured client-based workload in a valid, fair, and reliable manner that HF case managers found to be practical and credible for the range of services they provide. By incorporating the KHFCM Acuity Tool© into Microsoft Excel (2010) software, average caseload scores were formulated to autopopulate into monthly report formats (entitled the Kilgore Heart Failure Case Management Productivity & Panel Report© and Kilgore Heart Failure Case Management Comparative Report©) that minimized the administrative time required to analyze data and provided an expedient means for comparing scores for all HF case managers systemwide.

Future Implications

With the domains of HFCM service utilization and HF disease severity scored additionally yet separately from the workload domain, the KHFCM Acuity Tool© has the capacity to demonstrate how variability within these domains may correlate with client outcomes such as 30-day HF hospital readmission rates. It is proposed that data produced by the tool could guide such considerations as: What encounter frequency would be optimal for a client with HF disease severity "X" to prevent a 30-day HF readmission? In the same fashion, workload scores could be correlated with HF disease severity scores so that staffing considerations could be made on the basis of a caseload's average HF disease severity and projected HFCM service utilization frequency. The KHFCM Acuity Tool© could be readily applied to other HF case management programs by modifying the content matter to suit the unique types of case management services they provide. The KHFCM Acuity Tool© spreadsheet is additionally accessible on more recent versions of Excel (i.e., 2013) and macro-enabled smartphones,

making it easy for case managers to utilize the software on a variety of platforms.

Further Information

See the KHFCM Acuity Toolkit Overview, Supplemental Digital Content 1 (http://links.lww.com/PCM/A6), for a description of the complete software package. The document features product highlights, describes data entry methods, illustrates domain-scoring principles, and provides a summary of reported data parameters. For additional information, contact Matthew Kilgore at mdkilgore66@gmail.com.

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Matthew D. Kilgore, DNP, ARNP, FNP-C, completed the research and development for the following Kilgore Heart Failure Case Management (KHFCM) literary works: KHFCM Acuity Tool©, KHFCM Productivity and Panel Report©, and KHFCM Comparative Report©, while pursuing his doctorate of nursing practice degree in Tacoma, WA. During his nursing career, Dr Kilgore has assumed a variety of nursing roles including an acute cardiac care specialist, a cardiopulmonary rehabilitation specialist, and a clinical documentation specialist. He has shared a passion for case management since the start of his nursing career and has published a prior manuscript on the topic of transitional case management.

APPENDIX A
Quality Concerns for the Baseline Acuity Tool (HF Case Manager Agreement Percentage in Parentheses) ($N = 6$)

Primary Concerns[a]	Secondary Concerns[b]
Acuity tool does not capture time spent on declined referrals (83%)	Medication titration parameter needs more criteria; just yes or no is not enough (33%)
If the HF case manager could change any parameter it would be the medication titration parameter (83%)	Frequency of encounters (HFCM service utilization) is a poor reflection of workload (33%)
Encounter time does not capture time required for chart research and documentation (67%)	The total number of encounters seen is not factored into acuity score reports (33%)
Productivity benchmark of 75–80 active patients is too high for a 1.0 FTE (50%)	
NYHA Functional Class is a poor reflection of workload (50%)	

Note. FTE, full-time equivalent; HF = heart failure; HFCM = heart failure case management; NYHA = New York Heart Association. Quality concerns for the baseline acuity tool were addressed during the subsequent design of the KHFCM Acuity Tool©.
[a]Quality concerns were regarded as primary for HF case manager agreement percentages greater than or equal to 50%.
[b]Quality concerns were regarded as secondary for HF case manager agreement percentages greater than or equal to 33% and less than 50%.

APPENDIX B
Comparison of Time Parameters for the Baseline and KHFCM Acuity Tool©

Time Parameter Characteristics	Baseline Acuity Tool©, October 3 to October 31, 2016, Total Encounters $N = 684$	KHFCM Acuity Tool©, February 6 to March 6, 2017, Total Encounters $N = 682$	
Number of parameters	1	2	
Parameter titles	"Encounter complexity"	"Direct-care time"	
		"Indirect-care time"	
Parameter scoring scales	Encounter complexity	Direct care	Indirect care
	(1) <10 min	(1) ≤15 min	(1) ≤15 min
	(2) 10–20 min	(2) 16–30 min	(2) 16–30 min
	(3) 20–30 min	(3) 31–45 min	(3) 31–45 min
	(4) >30 min	(4) >45 min	(4) >45 min
Parameter score distributions	Encounter complexity	Direct care	Indirect care
	(1) 2% ($n = 14$)	(1) 27% ($n = 182$)	(1) 25% ($n = 172$)
	(2) 15% ($n = 100$)	(2) 55% ($n = 377$)	(2) 46% ($n = 316$)
	(3) 43% ($n = 294$)	(3) 14% ($n = 95$)	(3) 23% ($n = 159$)
	(4) 40% ($n = 276$)	(4) 4% ($n = 28$)	(4) 5% ($n = 35$)

Note. Encounter complexity on the baseline tool represented direct- and indirect-care time combined.

APPENDIX C
Interrater Reliability Between Case Managers and Researcher for All Case Studies

Case Manager	*M* Agreement Percentage
1	76
2	79
3	81
4	83
5	93
6	79

Note. Each of the six case managers completed, and scored, all six case studies. The percentages of agreement for all case studies were averaged to represent the mean agreement percentage for each case manager.

Instructions:

- Read the article. The test for this CE activity can only be taken online at www.nursingcenter.com/ce/PCM. Tests can no longer be mailed or faxed.
- You will need to create (its free!) and login to your personal CE Planner account before taking online tests. Your planner will keep track of all your Lippincott Professional Development online CE activities for you.
- There is only one correct answer for each question. A passing score for this test is 13 correct answers. If you pass, you can print your certificate of earned contact hours and access the answer key. If you fail, you have the option of taking the test again at no additional cost.
- For questions, contact Lippincott Professional Development: 1-800-787-8985.

Continuing Education Information for Certified Case Managers:

This Continuing Education (CE) activity is provided by Lippincott Professional Development and has been preapproved by the Commission for Case Manager Certification (CCMC) for 1.5 clock hours. This CE is approved for meeting the requirements for certification renewal.

Registration Deadline: March 1, 2019

Continuing Education Information for Certified Professionals in Healthcare Quality (CPHQ):

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Continuing Education Information for Nurses:

Lippincott Professional Development will award 1.5 contact hours for this continuing nursing education activity.

LPD is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

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The ANCC's accreditation status of Lippincott Professional Development refers only to its continuing nursing educational activities and does not imply Commission on Accreditation approval or endorsement of any commercial product.

Registration Deadline for Nurses: March 1, 2019

Disclosure Statement:

The authors and planners have disclosed that they have no financial relationship related to this article.

Payment and Discounts:

- The registration fee for this test is $17.95
- CMSA members can save 25% on all CE activities from *Professional Case Management*! Contact your CMSA representative to obtain the discount code to use when payment for the CE is requested.

DOI: 10.1097/NCM.0000000000000295