

Work-Sampling Study of an Innovative Care Coordination Program Aimed at Children With Chronic Health Conditions

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ABSTRACT

Purpose of Study: To estimate time allocation and labor cost for care coordinators (CCs), community health workers (CHWs), and mental health workers (MHWs) to conduct care coordination tasks in a pediatric care coordination program.

Primary Practice Setting: A public tertiary academic medical center in Chicago, IL.

Methodology and Sample: A work-sampling study was conducted using a text message-based survey on 5 CCs, 20 CHWs, and 4 MHWs who volunteered to participate. Workers were randomly sampled within working hours to collect information on who was the subject of interaction and what service was being delivered over a 6-month period. Time allocation of workers to different subjects and services was summarized using descriptive statistics.

Results: Care coordinators allocated 41% of their time to managing CHW teams. Community health workers allocated 37% of time providing services directly to children and 26% to the parent/caregiver. Mental health workers allocated 16% of time providing services to children and 29% to the parent/caregiver. The care coordination program serviced 5,965 patients, with a total annual labor cost of \$1,455,353.

Implications for Case Management Practice: Community health workers spent the majority of time working with patients and their families to conduct assessments. Mental health workers primarily addressed children's needs through their caregivers. Care coordinators primarily supported CHWs in coordinating care. Results may be used to inform development of such programs by determining services most often utilized, and labor cost may be used to inform program implementation and reimbursement.

Key words: *health care costs, health promotion/prevention/screening, mental health, pediatrics, social work*

The prevalence of chronic conditions in children 2 years and older has significantly increased since the late 1980s and has been estimated to be 21% in the United States (Van Cleave, 2010). The increase in chronic pediatric conditions is disproportionate among minority children whose odds of having a chronic condition among non-Hispanic Black and Hispanic children are 60% and 36% higher, respectively, compared with non-Hispanic White children. This trend especially affects enrollees in Medicaid, in which 6% of covered children have medical complexity, defined as a combination of the following four features: substantial health care needs that impose a financial burden to the family; one or more chronic conditions; functional limitations; and a high projected health care utilization (Berry et al., 2014; Cohen et al., 2011). About 46% of children

with medical complexity have three or more chronic conditions (Berry et al., 2014). In addition, children with medical complexity account for one third (\$1.6 billion) of Medicaid's total spending on children, with a small (5%) subset of children with medical complexity driving half of this cost.

The American Academy of Pediatrics has identified care coordination as a method to reduce cost and to mitigate the fragmentation and improve the

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Care coordination has been defined as the deliberate organization of patient care activities and sharing of patient information among all participants involved in the patient's care, including the patient himself or herself, to achieve optimal health outcomes. Care coordination has been hypothesized to reduce health care expenditures, increase the efficiency of care by transforming the management of chronic disease from a reactive process to an organized proactive process, and reduce the unmet needs of patients by establishing accountability and continuity in patient care.

quality of care for pediatric patients with chronic conditions (Council on Children With Disabilities and Medical Home Implementation Project Advisory Committee, 2014). Care coordination has been defined as the deliberate organization of patient care activities and sharing of patient information among all participants involved in the patient's care, including the patient himself or herself, to achieve optimal health outcomes (Agency for Healthcare Research and Quality, n.d.; Council on Children With Disabilities and Medical Home Implementation Project Advisory Committee, 2014). Care coordination has been hypothesized to reduce health care expenditures, increase the efficiency of care by transforming the management of chronic disease from a reactive process to an organized proactive process, and reduce the unmet needs of patients by establishing accountability and continuity in patient care (Council on Children With Disabilities and Medical Home Implementation Project Advisory Committee, 2014). Prior studies have demonstrated clinical benefits in children with asthma and a reduction of unmet needs among children in such programs (Arauz Boudreau et al., 2014; Cady et al., 2015; Janevic et al., 2016). In children with chronic conditions, care coordination has been positively associated with the timely receipt of necessary mental health care and specialty medical care (Miller, 2014). In addition, care coordination encounters may prevent unnecessary pediatric clinic visits, emergency department visits, and hospitalizations (Klitzner, Rabbitt, & Chang, 2010; Miller, 2014). Another study demonstrated that among families that reported receiving adequate care coordination in a medical home setting, there was a decreased odds of children missing school days and decreased family financial burden (Turchi et al., 2009).

The Coordination of Health Care for Complex Kids (CHECK) program is a novel care coordination program primarily focused on children and young adults with asthma, diabetes, sickle cell disease, and conditions of prematurity (Glassgow et al., 2017). The program engages children and their families to ensure that they receive proper health resources and health care through care coordination. The pediatric care coordination team is composed of (1) care

coordinators (CCs), (2) community health workers (CHWs), and (3) mental health workers (MHWs) (Glassgow et al., 2018; Martin, Perry-Bell, Minier, Glassgow, & Van Voorhees, 2019). Care coordinators had bachelor's or master's degrees, with additional care coordination experience. Care coordinators managed teams of CHWs and assisted in coordinating and facilitating patient services. All CCs received supervision from the Director of Care Coordination, who is a licensed clinical social worker. Community health workers were office-based staff with frequent field-based work charged with the goals of understanding the culture and needs of the communities in which they served. Although some CHWs had high school education, most had bachelor's degrees in public health, education, or general studies. They were trained to screen for health and social needs and to link the family to the appropriate resources. Community health workers helped families navigate the health system to receive timely care. Finally, CHWs provided disease education and goal setting for optimal disease management. Mental health workers included a combination of licensed providers and nonlicensed mental health professionals who were trained to more fully identify behavioral health needs and provide preventive interventions, consultative services, direct interventions, and referral services. Mental health workers had bachelor's degrees and were supervised by mental health specialists who were licensed clinical professional counselors and licensed clinical social workers. In a clinical trial that randomized 3,126 children and young adults to the CHECK program and 3,119 to usual care found that the CHECK program may decrease emergency department utilization in patients with high- to medium-risk asthma (Caskey et al., 2019).

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Measuring cost estimates for care coordination programs is essential for payers and health systems to determine whether implementation is feasible, given resource constraints, and data regarding labor cost of such programs are very limited. Therefore, this analysis addressed an important need in estimating the labor costs of pediatric care coordination by measuring time allocation of CCs, CHWs, and MHWs. The aim of this study was to determine the time allocation of CCs, CHWs, and MHWs over a 6-month period and to estimate the annual labor costs from the perspective of the health care system.

Although pediatric care coordination programs have demonstrated benefits, studies regarding operational costs are lacking. The annual labor cost of a pediatric care coordination team composed of a physician, a nurse practitioner, a registered nurse, a medical assistant, and clerical support has been estimated to be up to \$33,000 based on time solely devoted to care coordination activities (Antonelli & Antonelli, 2004). However, these estimates are from programs with very limited time/patient investment; cost estimates can vary drastically according to staff structure, services provided, and population type. Measuring cost estimates for care coordination programs is essential for payers and health systems to determine whether implementation is feasible, given resource constraints, and data regarding labor cost of such programs are very limited. Therefore, this analysis addressed an important need in estimating the labor costs of pediatric care coordination by measuring time allocation of CCs, CHWs, and MHWs. The aim of this study was to determine the time allocation of CCs, CHWs, and MHWs over a 6-month period and to estimate the annual labor costs from the perspective of the health care system. Health systems can use the data to help determine program operational cost, inform labor resource allocation within programs, and inform reimbursement decisions.

METHODS

Study Design

This study was a prospective work-sampling study evaluating the time allocation of workers to different services using a text message survey. Survey responses of workers were collected at random time intervals to provide a “snapshot” of the service a worker was providing at a particular point in time. The portion of working time devoted to a service was estimated from the proportion of responses obtained from the survey (Finkler, Knickman, Hendrickson, Lipkin, & Thompson, 1993).

Survey Development

The aim of the work-sampling survey was to determine the worker’s location, the subject of the interaction, and the service being performed. The survey was developed through a series of three focus groups consisting of program administrators, CCs, CHWs, and MHWs. The resulting CC survey consisted of a single question assessing the service category that was being performed at the moment the text message survey was received. The service categories were training, team management, hospital management, and consultations (see Figure 1A). The CHW survey consisted of a series of up to four questions, with Question 3 branching into different questions based on the response to Question 2 (see Figure 1B). The survey questions assessed CHW location at the time of the text, subject of the CHW task being performed, medical condition of the child being evaluated or addressed, and type of service being performed (health promotion, assessments and care planning, or maintenance). The MHW survey was structured similarly to that of the CHW survey but with different service category responses (prevention services/assessments, referrals, or direct services) (see Figure 1C). The subject of interaction of the CHW or MHW may be the child or parent/caregiver. Although the child was the focus of care, certain services for the child must be given through the parent or caregiver, such as health system navigation, referral to social services, or education on how to properly manage the child’s condition. The caregiver may be someone other than the parent, such as a babysitter, neighbor, family friend, or other nonfamily member. If the subject of interaction was not the child or parent/caregiver, the worker could select “other,” which represented tasks not directed to the family such as consultations with health care providers, staff meetings, or documentation. Workers could respond with “none of the above” if the service being delivered was not a response option and with “I am off today” or “I am on break.” The service categories for each worker and a brief description are provided in Table 1.

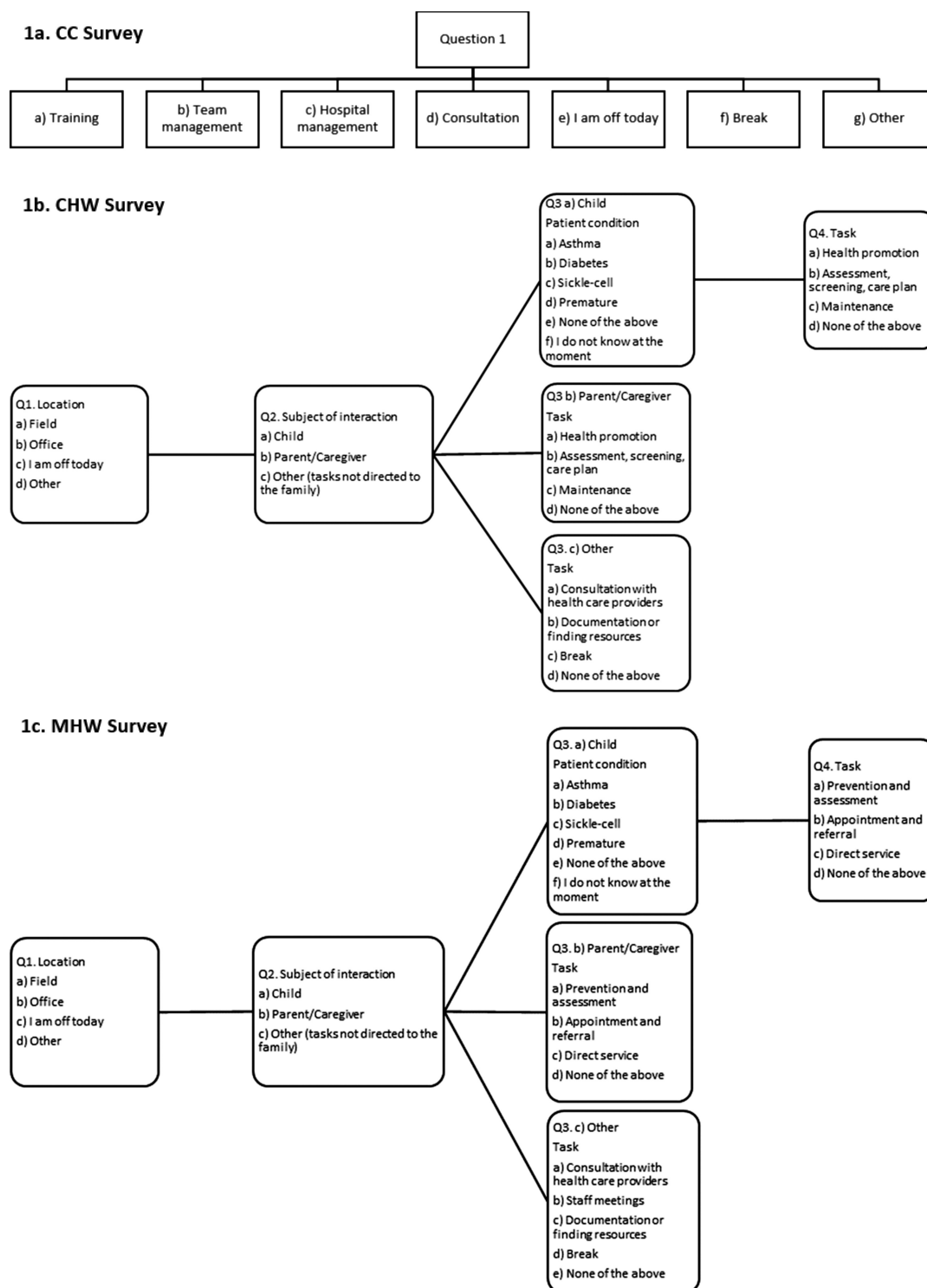


FIGURE 1

(A–C) Survey branch logic for CCs, CHWs, and MHWs assessing the location of the worker, subject of interaction, the child's health condition, and the service being delivered. CC = care coordinator; CHW = community health workers; MHW = mental health worker.

Participant Recruitment

Subjects were current CCs, CHWs, and MHWs employed by the CHECK program. A cellular phone

capable of receiving and sending text messages was required for participation in the survey, which was voluntary. A 20-min training session explained the purpose of the study, the type of data collected, use of

TABLE 1

Descriptions of the Different Services Provided by CCs, CHWs, and MHWs to Children and Their Families

Services	Description
CHWs	
Team management	Management of CHW teams, one-on-one meetings with individual CHWs, assigning patients to CHWs, and auditing
Hospital management	Following up on patients in the emergency department or in the inpatient setting
Consultations	Consulting with other CCs, CHWs, clinicians, or the data team
Training	Training CHWs on different disease states or attending a training session
CHW services	
Health promotion	Attending disease state training or providing disease education to a patient
Assessments, screenings, and care planning	Conducting a patient assessment and developing a care plan
Consultations	Consulting with MHWs, legal advisors, or clinicians
Maintenance	Visiting the patient in the home or accompanying the patient during a clinical appointment, and/or providing care coordination
MHW services	
Preventive services and assessments	Conducting a mental health assessment or conducting a follow-up assessment
Appointment and referrals	Coordinating a patient's appointment, referring the patient's family to community resources, or following up on patient referrals
Direct services	Conducting in-person interviews, therapy sessions, crisis interventions, or skill-building sessions
Consultations	Consulting with internal or external providers during clinical rounds or other cases

Note. CC = care coordinator; CHW = community health workers; MHW = mental health worker.

the collected data, and survey structure. Staff members were reassured that the data were not going to be used for job-related performance evaluation to ensure honesty in responses. Finally, workers were shown a demonstration on how to respond to texts using their cellular phone. The study was determined to be exempt from review by the university institutional review board.

Data Collection

The study was conducted from May to October 2017. A random number generator sampling from a uniform distribution was used to select texting times Monday through Friday between 9 a.m. and 5 p.m. and an individual to be sampled using Microsoft Excel 2016 (Microsoft Corp., Redmond, WA). A total of 50 to 60 samples were needed for each measured service category to extrapolate the proportion of time spent on a service category from the sample with 10% absolute error, assuming each service category accounted for an equal proportion of workers' time. Therefore, each CC and MHW was sampled an average of 10 times per week, and each CHW was sampled at an average of five times per week. To minimize response burden, workers received a maximum of four samples per day. Also, workers were asked to complete the text message survey at their earliest convenience to minimize disruption of patient care

and to respond to the survey according to the service being performed at the time of the text time stamp. A post hoc survey was conducted to gain insight into where the worker was if he or she was not in the field or office and into what service was being delivered if it was classified by the worker as "none of the above." MyTapp (Copyright 2013–2017 by the Board of Trustees of the University of Illinois), a two-way text messaging system designed for chronic disease management support and promotion of healthy behaviors, was used as the platform to deliver survey text messages and receive responses. Survey questions and responses were then downloaded and analyzed in Microsoft Excel 2016 (Microsoft Corp.) and SPSS Version 25.0 (IBM Corp., Armonk, NY).

Statistical Analysis

The primary outcome measure was the frequency and proportion of observations of each service category being performed by CCs, CHWs, and MHWs. The secondary outcome was the associated labor costs stratified by service category based on annual average salary.

The answers for each survey were analyzed as proportions. Total time allocated to a particular disease state was stratified according to the services delivered. Responses of "I am off today" or "I am on break" and missing responses were not included in

the calculation of proportions. Annual salaries were estimated from the Bureau of Labor Statistics (BLS) and averaged across all states for CCs, CHWs, and MHWs (U.S. Bureau of Labor Statistics, n.d.). Total labor costs for CCs, CHWs, and MHWs were extrapolated to all program workers and calculated as the product of proportion of time spent for each service category, annual average salary by worker type from BLS average estimates, and number of that type of worker employed by the CHECK program. Only direct labor costs, excluding fringe benefits, were included in labor cost estimates.

RESULTS

Time Allocation

All CCs ($n = 5$), 20 of 25 CHWs, and all MHWs ($n = 4$) volunteered to participate in the study. The CC response rate was 74% (688 answers out of 932 texts sent). The response rate of CHWs and MHWs to the first question was 65% (1,060 answers out of 1,621 texts sent) and 61% (284 answers out of 462 texts sent), respectively. Both CHWs and MHWs responded to more than 90% of the remaining survey questions.

Care coordinators allocated 41% of their time to CHW team management, 31% to visiting hospitalized patients, 10% to consultations with other providers, 4% to training CHWs, and 14% to other activities not captured by the survey (see Table 2). Most of CHW time was spent in the CHECK office (58%) and in the field (26%). The majority of time was allocated to providing a service to the child (37%) and to the parent/caregiver (26%), with the remaining time allocated to other tasks not directed to the family (37%). When providing a service to the child, the majority of time was allotted to assessments/screening/care planning (20%) and maintenance (10%) whereas the least amount of time was allotted to tasks not captured by the survey (5%) and health promotion (2%). When providing a service to the parent/caregiver, the time allocation was similar to that for the child—assessment/screening/care planning (16%), maintenance (5%), tasks not captured by the survey (3%), and health promotion (2%). When performing tasks not

directed to the family, 15% of time was allotted to documentation, 2% to providing consultations to health care providers, and 20% to services not captured by the survey.

The time allocation of MHWs is displayed in Table 2. Mental health workers spent about 80% of their time in the office and 7% in the field. They allocated the greatest proportion of time to performing tasks not directed to the family (55%), followed by providing a direct service to the parent/caregiver (29%), or to the child (16%). When performing tasks not directly related to the family, the majority of time was allotted to documentation (18%) and staff meetings (15%) whereas equal time was spent on consultations with other health care providers and other services not captured by the survey (11%). When providing a service to the parent/caregiver, the majority of time was allotted to preventive services/assessments (19%) and referrals (6%) whereas the least amount of time was allotted to direct services (3%). When providing a service for the child, the majority of time was allotted to providing preventive services/assessments (11%) whereas relatively little time was allotted to direct services (3%) and referrals (1%).

Labor Cost

The total annual labor cost for the entire program was estimated to be \$1,455,353 (see Table 2). Labor cost was largely attributed to CHWs (\$959,250), followed by CCs, (\$322,903), and, finally, to MHWs (\$173,200). Community health worker labor cost was primarily directed toward services for the child (\$354,923), but MHW labor cost was primarily directed toward services for the parent/caregiver (\$50,228). Among CCs, labor cost was primarily driven by managing teams of CHWs (\$131,613) and following up on patients who have been recently admitted to the hospital (\$99,677). At the start of this study, the cumulative number of children enrolled in the program was 16,410 and the cumulative number of engaged children (i.e., among enrolled children, those who have at least started or completed a single assessment interview and received direct outreach and services) was 5,965. The total per member per month (PMPM) labor cost was \$7.39 for the entire

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TABLE 2

The Percentage of CC, CHW, and MHW Time Allocated to the Different Services Provided for the Child, Parent/Caregiver, or Other Tasks Not Directed to the Family and the Associated Labor Costs

Subject of Interaction	Frequency (%)	Total Time Allocated to a Service Type	Frequency (%)	Labor Cost ^a
CHWs				
Child	299 (37)	Assessment/screening/care planning	151 (20)	\$191,850
		Maintenance	76 (10)	\$95,925
		Health promotion	17 (2)	\$19,185
		None of the above	35 (5)	\$47,963
		Total	279 (37)	\$354,923
Parent/caregiver	214 (26)	Assessment/screening/care planning	126 (16)	\$153,480
		Maintenance	44 (5)	\$47,963
		Health promotion	18 (2)	\$19,185
		None of the above	21 (3)	\$28,778
		Total	209 (26)	\$249,405
Other tasks not directed to the family	302 (37)	Documentation	100 (15)	\$143,888
		Consultations	16 (2)	\$19,185
		Meetings	—	\$0
		None of the above	137 (20)	\$191,850
		Total	253 (37)	\$354,923
Total	815 (100)			\$959,250
MHWs				
Child	37 (16)	Preventive services/assessments	26 (11)	\$19,052
		Direct service	6 (3)	\$5,196
		Referrals	3 (1)	\$1,732
		None of the above	2 (1)	\$1,732
		Total	37 (16)	\$27,712
Parent/caregiver	63 (29)	Preventive services/assessments	37 (19)	\$32,908
		Direct service	5 (3)	\$5,196
		Referrals	13 (6)	\$10,392
		None of the above	3 (1)	\$1,732
		Total	58 (29)	\$50,228
Other tasks not directed to the family	121 (55)	Documentation	33 (18)	\$31,176
		Consultations	21 (11)	\$19,052
		Meetings	28 (15)	\$25,980
		None of the above	21 (11)	\$19,052
		Total	103 (55)	\$95,260
Total	221 (100)			\$173,200
CCs				
		Training	14 (3.9)	\$12,581
		Team management	148 (40.8)	\$131,613
		Hospital management	112 (30.9)	\$99,677
		Consultation	37 (10.2)	\$32,903
		Other	52 (14.3)	\$46,129
		Total	363 (100)	\$322,903
Estimated annual program labor cost				\$1,455,353

Note. CC = care coordinator; CHW = community health workers; MHW = mental health worker.

^aLabor cost was based on all program personnel (CHW: $n = 25$; MHW: $n = 4$; and CC: $n = 5$). Average annual salaries were estimated to be \$64,516 for CCs, \$38,370 for CHWs, and \$43,300 for MHWs from the Bureau of Labor Statistics.

Stratifying CHW service categories according to disease type showed that assessment/screening/care planning was the most frequently delivered service.... Maintenance service was the second most frequently delivered service (22% of patients with asthma, 38% with diabetes, 33% with sickle cell disease, 27% with a previous diagnosis of prematurity, and 38% with other diseases). Health promotion was the least frequently delivered service across all disease categories. Stratifying MHW service categories by disease type showed that prevention/assessment service was the most frequently delivered service.

population and \$20.33 for the subset of children who received direct outreach and services.

Time Allocation to Services According to Disease Type

Among the subset of children who received direct outreach and services, 64% had asthma, 6% had diabetes, 3% had sickle cell disease, 4% were born premature, and 22% had other nonchronic conditions. Stratifying CHW service categories according to disease type showed that assessment/screening/care planning was the most frequently delivered service within all disease categories (61% of patients with asthma, 50% with diabetes, 43% with sickle cell disease, 43% with a previous diagnosis of prematurity, and 25% with other diseases) (see Table 3). Maintenance service was the second most frequently delivered service (22% of patients with asthma, 38% with diabetes, 33% with sickle cell disease, 27% with a previous diagnosis of prematurity, and 38% with other diseases). Health promotion was the least frequently delivered service across all disease categories. Stratifying MHW service categories by disease type showed that prevention/assessment service was the most frequently delivered service (85% of patients with asthma, 60% with diabetes, 50% with sickle cell disease, and 63% with other diseases) (see Table 4). Direct service was the second most frequently delivered service (10% of patients with asthma, 20% with diabetes, and 100% with a previous diagnosis of prematurity, and 12% with other diseases). Appointment and referral service were the least frequently delivered service.

Post Hoc Survey

In the post hoc survey, CHWs reported that services provided to the child or parent/caregiver not captured by the primary survey included attending school meetings to discuss accommodations for children with chronic conditions (e.g., individualized education program or 504 plans), providing moral support to parents, and accompanying parents to the state benefits office. When performing tasks not directed to the family, other tasks that were not captured by the survey included researching recommendations for patients, checking patient hospital records, and attending training sessions. Mental health workers reported that when performing tasks not directed to the family, tasks that were not captured included planning therapy sessions, translating patient materials for therapy sessions, and performing administrative tasks. Mental health workers also reported operating a text message service to better communicate with patients. Finally, CCs reported that tasks not captured by the survey included attending staff meetings.

DISCUSSION

Care coordinators primarily supported CHWs, dedicating the majority of time to CHW team management and following up on patients admitted to the emergency department or hospital. Community health workers primarily focused their time on providing services to the child compared with the parent/caregiver. In contrast, MHWs primarily

TABLE 3

The Percentage of Time Allocated to Each CHW Service Category for a Given Disease Type

	Asthma (n = 186)	Diabetes (n = 42)	Sickle Cell Disease (n = 21)	Premature (n = 30)	None of the Above (n = 8)	Unknown (n = 10)
Health promotion	6%	0%	0%	10%	12%	10%
Assessment/screening/care planning	61%	50.0%	43%	43%	25%	60%
Maintenance	22%	38%	33%	27%	38%	20%
None of the above	11%	12%	24%	20%	25%	10%

Note. CHW = community health workers. A child with more than one chronic condition can contribute to multiple disease categories.

TABLE 4**The Percentage of Time Allocated to Each MHW Service Category for a Given Disease Type**

	Asthma (n = 20)	Diabetes (n = 5)	Sickle (n = 2)	Premature (n = 2)	Unknown (n = 8)
Prevention/assessment	85%	60%	50%	0%	63%
Appointment/referral	0%	20%	0%	0%	25.00%
Direct service	10%	20%	0%	100%	12%
None of the above	5%	0%	50%	0%	0%

Note. MHW = mental health worker. A child with more than one chronic condition can contribute to multiple disease categories. MHWs did not report seeing patients with other diagnoses.

focused their time on providing services to the child through the parent/caregiver. Regardless of whether the child or parent/caregiver was the subject of interaction, both CHWs and MHWs most frequently performed assessments/screenings/care planning and preventive services/assessments, respectively. These tasks were also the most frequently delivered service within each disease state. Overall, the results are consistent with the mission of the CHECK program—engaging the child and family while focusing on proactive care through health screenings or assessments and development of care plans.

Limited evidence exists regarding how time is allocated to different services within a care coordination program and the associated program cost. The Behavioral Health Integration and Complex Care Initiative implemented in California clinics is a Medicaid program that aims to integrate complex care management with behavioral health through a team of care managers, behavioral health clinicians, practice coaches, and CCs (Gilmer et al., 2018). The program reported an average staffing cost of \$266 PMPM. A care coordination program for children with special health care needs reported an average of 13 min per care coordination encounter and a direct personnel cost per care coordination encounter of \$4.39 to \$12.86 (Antonelli, Stille, & Antonelli, 2008). The costs represented non-billable and nonreimbursable costs for services delivered by physicians, nurses, medical assistants, social workers, and patient advocates. We report a PMPM cost of \$7.39 for the entire population and \$20.33 for the subset of children who received direct outreach and services. Estimates likely vary on the basis of the type of services provided, the type of population targeted and their needs, as well as the type and number of personnel in the program. Therefore, cost estimates may not be directly comparable across studies. However, our study provides insight into the operation, labor allocation, and annual labor costs of a pediatric care coordination program for underserved children with chronic diseases. In addition, the PMPM cost can be used either by health insurers and managed care plans to estimate reimbursement costs or by health systems to inform program development.

LIMITATIONS

The study had several limitations. The study was conducted during the period in which the program received a grant, and the results may not be reflective of program operation once grant funding ended, as changes were made to staffing that may have affected time allocation to the various services. In addition, a misclassification bias may exist, as workers were asked to respond to survey questions at their earliest possible convenience after patient interactions were completed to avoid disruptions to patient care. Both CHWs and MHWs responded in 65% of cases to the first survey question, whereas CCs responded to 74% of cases. If missing responses did not occur at random, the survey results could be biased. One possible example could be that respondents were less likely to respond while in the field, versus in the office, potentially underreporting field-based tasks. In addition, responses were not tracked at the patient level and responses may be more reflective of children and families that had a high need for care coordination services. Finally, the sample size of the study was relatively small. However, the long observation period with repeated sampling improved the precision of the estimates and the use of text messages reduced the influence of direct observation on subject behavior and burden of paper-based self-report.

CONCLUSION

The findings of the study are consistent with the mission of the CHECK program—a service focusing on interacting with children and their families to provide comprehensive coordinated care. Further research is needed to evaluate the impact of the program on patient clinical outcomes and quality of life, and its cost-effectiveness.

IMPLICATIONS FOR CASE MANAGEMENT PRACTICE

Very few studies have measured labor and costs of care coordination programs. We believe this is the first study providing a detailed assessment of program tasks. These findings have important implications for

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practice and program management. Having a better understanding of how case management teams work together, how sharing and handoff of tasks occur, and labor time associated with each allows for the development of more efficient and potentially effective models of care. In addition, as new care coordination models are proposed, this study provides the most comprehensive report to date on the costs associated with labor in care coordination programs. Using our report, new models can better estimate the costs of their programs by reflecting on differences between those programs and the CHECK program. Finally, it is possible that the results of this study can be used to better justify reimbursement for services, assessments, and the development of care plans by demonstrating to payers the efforts required for care coordination.

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