

Development and Preliminary Evaluation of an Innovative Advanced Chronic Disease Care Model

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ABSTRACT

- **Objective:** To describe and evaluate Sharp's Transitions program as a model of caring for the advanced heart failure (HF) population.
- **Methods:** Sharp HealthCare developed an innovative advanced chronic disease model of care that addresses patient, family, and caregiver needs throughout the progression of their illness. Advanced HF patients enrolled in Transitions between January 2008 and December 2010 were evaluated ($n = 155$). Patient demographic data, hospital and emergency department (ED) utilization, and total costs of care were obtained from electronic medical records to determine acute care utilization and total care costs for patients before and after enrollment.
- **Results:** Mean length of stay in Transitions was 165 days. 74% transferred into hospice care upon discharge. Within-group analysis showed a significant decrease in hospitalization rate after enrollment in Transitions, from 32% to 17%. There was also a significant decrease in ED visit rate after enrollment, from 57% to 31%. The average total cost of care decreased significantly during enrollment (\$73,025 vs. \$46,588).
- **Conclusions:** Aligned with the goals of comprehensive care management, Transitions provides an innovative model of health care delivery for the advanced chronic disease population that may be replicable across diverse chronic disease patient populations and health care organizations.

Heart failure (HF) is the most common diagnosis for hospitalized patients aged 65 and older and is the only cardiovascular disease that is increasing in incidence and prevalence [1–4]. The majority of HF costs can be attributed to hospitalizations for exacerbations of the disease [5,6]. Hospitalizations

place an overwhelming burden on patients, families, and the health care system yet are thought to be preventable in 40% of cases [7,8]. Furthermore, readmission rates have not decreased for HF patients over the last decade, despite efforts to improve quality performance in the hospital setting [9]. Common modifiable causes of preventable hospitalizations for HF patients include poor discharge planning, poor follow-up, noncompliance with prescribed drugs and diet regimen, and failure to seek treatment for worsening symptoms [6]. Another significant factor increasing the risk for readmission is the failure of the patient, their support system, and their care providers to address social and functional characteristics that make them susceptible to hospitalization, such as cognitive impairments, socioeconomic status, depression, and comorbidities [10].

There is an increasing demand for health care systems to develop new models of care delivery that better guide patients and their families through chronic disease progression, such as HF, and minimize the occurrence of preventable adverse events. New models should provide cost-effective, patient-centered care coordination that not only reduces the risk for readmission after a chronic disease exacerbation but prevents the exacerbation necessitating a hospitalization from occurring in the first place.

In response to this need, Sharp HealthCare has developed Transitions, an innovative program designed to address the failures of traditional models of chronic disease care. Transitions is a concurrent model of care: patients and families receive aggressive palliative services through the program concurrently with their usual care. Transitions is based on 4 evidence-based pillars:

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in-home medical consultation, ongoing evidence based prognostication, caregiver support, and advance health care planning. By providing proactive medical and psychosocial management of patients with advanced HF and evidence-based prognostication to guide the patient and family in the inevitable progression of their chronic disease, the program aims to coordinate care that occurs outside the hospital and that is tailored to patient care goals. The program is designed to prevent any acute care utilization related to chronic disease progression rather than just reduce it.

While each Transitions pillar is evidence-based, there are no descriptions in the literature of a program coordinating all 4 components together as a model for practice. The purpose of this article is to describe and evaluate Sharp HealthCare's Transitions program as an innovative model of caring for the advanced congestive HF population.

PROGRAM DESCRIPTION

Setting

Sharp HealthCare is a not-for-profit integrated regional health care delivery system based in San Diego, California, serving 3.1 million residents through a network of 7 hospitals, 2 affiliated medical groups, a hospice program, and many other facilities and services. The Transitions program was developed by Sharp HospiceCare in 2005 and implemented in 2007 in collaboration with Sharps' 2 medical groups, Sharp Rees-Stealy Medical Group and Sharp Community Medical Group.

In the United States, hospice care is an end-of-life service associated with increased government Medicare benefits and regulations. It can be chosen by a patients when they or their providers feel they have 6 months or less to live if the disease were to take its natural course. It is a specialized form of palliative care with additional health care benefits, such as additional medication and home service benefits.

Transitions is a concurrent care home-based program designed for patients with advanced chronic illness who would benefit from a trained palliative care team comprising doctors, nurses, spiritual care providers and social workers to provide symptom management, pain control, increased patient and family awareness of illness trajectory and treatment choices, and psychosocial and spiritual support. In this concurrent system, palliative care is added to traditional HF management. Over time, as the patient's conditions progresses, palliative services, which

are associated with improved quality of life and longevity, increase, while traditional services, which are associated with increased risk for hospitalization, decrease or are managed by the palliative team. Palliative and traditional services frequently overlap in the desire to maintain a person's comfort. Most palliative care programs in the United States were developed to be administered in the hospital setting, but the palliative service in this model is brought to the patient's home. In this regard the palliative team reinforces good outpatient cardiac management. Patients continue to see their traditional providers, and are not required to have a Medicare Part A skilled need or be homebound.

As mentioned, Transitions is based on 4 pillars: (1) in-home medical consultation, (2) evidence-based prognostication, (3) caregiver support, and (4) advance care planning (Table 1).

Pillar 1: In-home Consultation

Research supports home-based intervention as an inexpensive but highly effective addition to pharmacotherapy in managing HF [11]. HF patients who participate in home-based interventions experience improved health outcomes such as improved quality of life and decreased hospital readmissions, length of stay, and health care costs [6,11,12]. The results of a recent clinical trial support home-based intervention as more cost-effective than a clinic-based approach to managing elderly patients with HF. In addition, patients also had better overall survival with a home-based approach, with a 30% decrease in mortality rates [13]. Hospice-based palliative care, which typically involves extensive home consultation, has also been associated with statistically significant better survival over usual care for HF patients [14,15].

Education and counseling are important parts of most home-based interventions for HF and include patient, family, and caregiver education; behavioral strategies to increase adherence to prescribed medications, diet and physical activity recommendations; monitoring for early signs and symptoms of compensation; and education and active guidance on what to do in the case of escalating signs and symptoms.

Pillar 2: Evidence-based Prognostication

Patients and families with advancing chronic illnesses need accurate information on life expectancy to realistically plan their futures [16]. Unfortunately, in general it has been shown that almost two-thirds of providers,

Table 1. *Transitions* Activities by Pillar and Phase of Intervention

Phase	Pillars			
	In-home Consultation	Evidence-based Prognostication	Caregiver Support	Advance Care Planning
Goals of Care	<p>Give patient, family and caregiver knowledge and skill-set to proactively manage the disease</p> <p>Improve compliance with medical plan</p> <p>Reduce preventable hospital and ED visits</p>	<p>Utilize evidence-based prognostication methods to provide accurate survival and event estimates</p> <p>Prepare patient, family and caregiver for inevitable disease manifestation process</p> <p>Allow patient to make informed decisions about their goals of care while family and caregiver are reconciled and patient has capacity</p>	<p>Identify caregiver needs and support</p> <p>Reduce emotional and physical strain to caregiver</p> <p>Improve quality of life in caregiver</p> <p>Improve caregiver satisfaction</p> <p>Help caregiver care for their loved one and cope with the often difficult responsibility of doing so</p> <p>Validate that caregiver can respect patient wishes</p>	<p>Create roadmap for all future care and interventions</p> <p>Improve communication and establish agreement between patient, family and caregiver on end-of-life wishes</p> <p>Improve surviving family/caregiver satisfaction</p>
Active Phase (1–3 months)	<p>4–6 weekly home visits from RN; 1-3 home visits from social worker; home visits from spiritual care provider if needed</p> <p>Telephone follow-up calls between home visits</p> <p>Education includes disease process and progression, medication management and rationale, diet, exercise, lifestyle considerations within context of the disease, early recognition of signs and symptoms that should be reported and managed, and other practical coping skills.</p> <p>Social worker conducts complete psychosocial assessment including assessment of patient, family and caregiver financial needs, alternative placement needs, and spiritual care needs.</p>	<p>Physician provides evidence-based prognostication, giving honest and comprehensive facts to the patient, family and caregiver around the progressive nature of the disease during clinic visits</p>	<p>Family is an integral component of the in-home consultation visits</p> <p>Family receives community resources and counseling</p> <p>Patient, family and caregiver receive round-the-clock telephone access to a trained RN for help with emergent needs and concerns</p>	<p>Develop Advance Care Plan including Advance Directive and POLST with help from the Transitions social worker</p> <p>Based on patient wishes within the framework of the family support system and structure</p>
Maintenance Phase (ongoing)	<p>1-2 home visits per month, more if needed</p> <p>Telephone follow-up in between home visits</p>	<p>Continued care coordination and collaboration with the primary care or specialty physician</p>	<p>Patient, family and caregiver receive round-the-clock telephone access to a trained RN for help with emergent needs and concerns</p>	<p>Completed</p>

specialists, and primary care physicians overestimate prognoses regarding end-of-life by 530% [17]. Murray et al [16] showed that for HF patients, both patients and providers underestimate mortality. This over-optimism is associated with patients receiving more traditionally aggressive treatment than desired, including increased hospitalizations as disease progresses [18,19]. Prognostic uncertainty may postpone planning for patients near the end of life, such as patients with progressive HF [21].

Cancer research has shown that accurate prognostication by skilled practitioners allows clinicians, patients, and families to make informed decisions regarding the type of care patients wish to receive as their disease steadily advances [20]. Prognostication helps the patient and care providers move away from a reactive model of health care to a proactive model that takes a more patient-centered approach. A recent study showed that among seriously ill hospitalized Medicare beneficiaries, 60% expressed a preference for comfort care over traditional medical treatment, but the majority of those patients felt they were receiving care inconsistent with these wishes [22]. In general, prioritizing comfort was found to be the preference in 92% of patients who participated in advance care planning; 5% would limit treatment and only 3% wished for all traditional care possible [23].

Prognostication frequently asks the question “How long do I have to live?” In the Transitions model, the more important question is “What comes next in the expected series of events for the natural progression of my medical condition?” We call this event prognostication. The majority of HF patients have a predictable and gradual progression towards mortality resulting from their chronic disease [24]. While this progression may follow differing subpatterns of decline [24], this phenomenon is overcome in the Transitions program, as event prognostication is more concerned about *what* comes next, not *when*. Event prognostication borrows concepts from anticipatory guidance [25], a proactive counseling technique that focuses on the needs of children at each stage of their development. The goal of anticipatory guidance is to provide practical information to parents about physical and emotional milestones before they occur so that parents can anticipate expected behaviors and to guide families on injury prevention during each stage to keep their children safe. The Transitions program basically extends this model to adults with chronic disease and considers any hospitalization from a HF exacerbation an untoward event.

Pillar 3: Caregiver Support

HF patients are often reliant on caregivers such as family or friends to provide many of their maintenance care needs, yet caring for an ill patient is burdensome and stressful for many family members [26]. Findings consistently show that providing supportive care contributes to increased risk in the caregiver for physical and psychiatric morbidity and mortality [27,28]. It is important for health care providers to prioritize caregiver assessment and support when caring for their loved ones to ensure both patient and caregivers are getting the care they need [29]. Involving caregivers meaningfully in all facets of patient care planning and education can reduce the negative consequences of family caregiving [28]. Family caregivers for HF patients who were offered more involvement in patient care planning had higher satisfaction scores, higher feelings of preparedness, were more accepting of their role as caregiver, and reported better health when compared to family caregivers who were not offered involvement in care planning [30]. In addition to providing caregiver support, Transitions directly educates caregivers about HF and teaches them how to look for early signs of HF deterioration so that intervention can occur with the least untoward event. The intention of directly addressing caregiver support is to improve caregiver morbidity and mortality and also to improve patient outcomes.

Pillar 4: Advance Care Planning

It is necessary for patients and caregivers to discuss and recognize patient’s care preferences, especially towards end of life, if patients are to receive care that is consistent with their goals [31]. Although making decisions at the end of life can be traumatic, providing information to family members, involving them in discussions and developing advance directives can reduce symptoms of post-traumatic stress, anxiety and depression that occur during advancing illness progression [32]. Advance care planning that emerges from a process of discussion and patient and caregiver feedback has been shown to be successful in ensuring care is provided that is consistent with patient goals [33,34], including increasing the probability that the patient will die at home as their preferred site of death [35,36].

Elements of effective advance care planning include clarifying a patient’s understanding of their illness and treatment options; understanding their values, beliefs, and goals of care; identifying their wishes; and if

required, designation of a substitute decision maker. The aim of advanced care planning in the Transitions program is to emotionally prepare patients, families, and their caregivers for the inevitable consequences of the natural progression of their chronic disease process, thereby helping to resolve family moral conflict about what the patient's wishes are at the end of life period. The goal is to keep this discussion out of the emergency room, ICU, or hospital, where the patient may be obtunded or under duress when decisions need to be made. Through this proactive planning process, family have time to adjust to the patient's stated goals before expected events take place. This helps to ensure care delivery remains consistent with the patient's wishes up until death.

PROGRAM IMPLEMENTATION

Transitions uses a multidisciplinary team-based approach, consisting of specially trained physicians, registered nurses (RNs), social workers, spiritual care providers, and a 24/7 dedicated call system. The program is overseen by both the chief medical officer and the vice president of Sharp HospiceCare and is led by a clinical program coordinator. The Transitions program employs 2 RNs, each with a strong hospice and homecare background and previous experience caring for cardiac patients. Each RN's caseload generally consists of a rotating census of 30 to 35 patients. The program also utilizes the Sharp HospiceCare dedicated call center to provide immediate patient, caregiver, or family support when the RN is unavailable. The program shares 1 social worker with Sharp HospiceCare. Initial start-up costs for the program were funded by a grant from Sharp Grossmont Foundation. The program initially contracted with 2 Sharp affiliated medical groups using Medicare Advantage contracts for patient referral.

Active and Maintenance Phase

The program organizes care into active and maintenance phases (Table 1). During the active phase, patients receive 4 to 6 weekly home visits from their RN. Follow-up calls are delivered between each home visit, and follow-up visits are arranged after any changes in the patient's status, such as changes in functional abilities or alterations in medications. An electronic medication profile is created for each patient during the first visit and is updated during each visit. Patients, families and caregivers receive 24-hour telephone access to a trained RN for help with emergent needs and concerns. The goal is for patients to receive the majority of their health care needs at home.

Patients are also seen by the Transitions social worker approximately 1 to 3 times over a 1- to 3-month period. During these visits, the social worker conducts a complete psychosocial assessment to evaluate patient, family, and caregiver financial, resource, and spiritual care needs. The social worker provides community resource referrals and counseling as needed and assists the patient, family, and caregivers to create an advance health care plan in collaboration with the patient's care providers. The plan includes an advance directive and POLST (Physician Orders for Life-Sustaining Treatment).

When the advance health care plan has been finalized and consensus is reached regarding patient's readiness to self-manage their illness, the patient is transitioned into the maintenance phase. Patients still receive 1 to 2 home visits per month in the maintenance phase, during which the RN evaluates the home setting and patient functional status, and addresses any concerns raised by the patient, caregivers or family. Home visits are critical during the maintenance phase to detect declines in functional status that may go unrecognized by the patient. Home visits can also be triggered by patient request or by changes made in the patient's care plan by their physician. All visits are followed up with telephone calls to ensure the patient is managing their care needs adequately. Patients and families also have 24-hour telephone access to a trained RN for help with emergent needs and concerns.

Ongoing coordination and collaboration with the primary care or specialty physician also continues throughout the maintenance phase. A standardized care plan is updated after every visit and transmitted to the patient's primary physician, who uses it in their regular care. Transitions encourages in-home treatment of acute exacerbations as a preferable alternative to acute hospitalization. Many times emergent care needs can be facilitated by the RN through direct communication with the Transitions or referring physician. This typically happens through a phone conversation or email and may result in changes to patient medications, identification of social issues needing attention or the need to bring in other home services such as wound care, or perhaps a need for specialist referral. All evaluations are sent to the patient's primary physician, who then decides and initiates orders.

The ultimate goal of Transitions is to manage the patient's advanced chronic illness without hospitalization and maximize patient comfort care prior to a smooth transfer to hospice care, which is the goal for the majority of the patients. Throughout their enrollment period

Table 2. Examples of Evidence-Based Prognostication Factors Used in Transitions Program

Prognostication Factors	Examples	How used
General prognostic data	<ul style="list-style-type: none"> • Age • Gender • BMI • Depression • Geriatric frailty syndrome 	<ul style="list-style-type: none"> • Greater risk as age rises • Males at greater risk than females • BMI < 22 or > 27 increases risk • Weight loss increases risk • Depression increases risk • Geriatric frailty syndrome increases risk
Biometric models	<ul style="list-style-type: none"> • NYHA heart failure classification • Medicare hospice LCD (local coverage determinants) • BODE (pulmonary), MELD (liver), SEER (cancer), ECOG (cancer), FAST (dementia) 	<ul style="list-style-type: none"> • For example, Stage 4 associated with 50% mortality rate at 1 year • Try to find patient nearly but not meeting criteria yet (as appropriate for Transitions) • Assist with predicting trajectory
Functional decline patterns	<ul style="list-style-type: none"> • End-organ disease • Cancer • Debility such as frailty syndrome or dementia 	<ul style="list-style-type: none"> • Decline patterns for chronic disease and cancer are different and found in the literature • Knowledge decline patterns assist with recognition of pre-terminal patients at risk of hospitalization
Disease-specific biological data	<ul style="list-style-type: none"> • Lab values (BNP) • Trends of lab values 	<ul style="list-style-type: none"> • For example, BNP or pro-BNP for heart failure helps diagnose acuity
Non-disease-specific biological data	<ul style="list-style-type: none"> • Lab values (BUN, creatinine, CRP, hsCRP, albumin) • Trends of lab values 	<ul style="list-style-type: none"> • Numerous markers identified based on disease state • Nutritional status is important risk factor
Psychosocial factors	<ul style="list-style-type: none"> • Caregiver support • Socioeconomic status 	<ul style="list-style-type: none"> • Poor social and caregiver support increases risk of hospitalization

patients, caregivers, and family learn about hospice care and the invaluable services it can provide when major functional decline signals the end of the disease progression, and when the Transitions program can no longer fully provide the care they need.

Ongoing Physician Role in Evidence-Based Prognostication

Sharp primary care and specialty providers can refer patients to the Transitions program if they suspect the patient may start utilizing the hospital as a tool to manage their disease, for example, visiting the emergency department for HF exacerbations. Case managers and chronic care nurses may also refer to the program regardless of site. Transitions physicians collaborate with Sharp primary care and specialty providers to provide evidence-based prognostication for their patients on a continuous basis to help them recognize when a patient is at high risk of using the

hospital as a tool to manage their disease. In this way, non-palliative care providers, physicians, and nurses learn how and when to refer patients to the Transitions program.

There are many indicators that can be used to predict decline rates, such as patient demographics, biometric models for specific diseases (such as the New York Heart Association’s heart failure classification system), functional decline patterns (such as activities of daily living [ADL] deficit), disease-specific and general lab values (including trends over time), and psychosocial factors that can influence decline patterns. Transitions physicians integrate all available data to predict the disease-specific rate of decline for each patient individually, and at regular intervals over time. Prognostication is a skill honed over time, as much an art as evidence-based practice. Clinical indicators that help physicians recognize a patient’s trajectory are detailed in **Table 2**. A process example is provided in the **Box** (page 414).

EVENT PROGNOSTICATION: A PROCESS EXAMPLE

As part of the Transitions program, providers are retaught the lost art of evidence-based medical prognostication as they are being introduced to palliative care strategies. Primary and specialty providers are taught to recognize when a patient will start to use the hospital as a tool to manage their illness (typically related to deteriorating condition and the inability to self-manage at home). It is important to note that Transitions is a concurrent model of care, and that the primary and specialty physicians are not relinquishing care. In fact, the Transitions palliative team needs their input to ensure patients are receiving maximum medical therapy in order to avoid using the hospital as a reactive tool for chronic disease management and to assure that the patient, family, and physicians are morally absolved that they have done everything that they should.

Prognostication, for Transitions, is based on probabilities. A biometric model such as the New York Heart Association heart failure classifications serves as a starting point for both time and event prognostication, as each HF stage is associated with worsening symptomology and a specific time frame. The provider assesses many other prognostication factors as well, and uses their professional skill to determine which side of the bell curve the patient is on regarding eventual decline. For example, an elderly, depressed male with recent weight loss, a BMI of 18 and geriatric frailty syndrome is more likely on a different side of the bell curve than a younger female with a stable BMI of 25 who is not depressed, even though they may be categorized by the same NYHA stage. The way this is represented to patients is to say, "If I had 100 patients in your situation, this is what I would expect the bell curve to look like. This is the natural progression of your disease at this stage and this is the average time associated."

ADL decline is an important prognostication factor, associated with increased risk for hospitalization and mortality [37]. In general, the year a patient develops gradual severe disability (going from 1 or 2 ADL deficits to 3 ADL deficits) is associated with a 48.6% chance of hospitalization and 72.1% chance for catastrophic severe disability (going from 0 to 3 ADL deficits). A HF patient who reports to their physician's office for new-onset urinary incontinence and who already needed assistance with bathing and has difficulty with transferring would be identified as having gradual severe disability, which will influence their decline pattern. Other important factors to consider are changes in disease-specific and non-specific biomarkers, as well as increases in medications and treatments over time [38]. Physicians can learn to advise their patients regarding future risks with comments such as, "Mr. Smith, in general about 50% of people who have developed your level of functional decline will be hospitalized (EVENT) in 1 year (TIME). How about if we make it so that you have a better chance of not having to call 911 for that admission?"

Event prognostication is important because it ensures the patient's treatment path is consistent with the goals of care. It is also a meaningful step in transitioning away from an outdated, reactive model of chronic care management. It is particularly important to recognize that many end-organ disease patients, such as HF patients, may not have significant ADL deficits, be generally alert, oriented, pain-free and receiving their care exclusively in outpatient offices as little as 6 to 12 months prior to death [24]. In the Transitions program, the patient's referring physician continues to manage the patient's care in conjunction with the Transitions team. Once patients are enrolled in the Transitions program, accurate, effective, professional and compassionate information regarding event prognostication is discussed and disseminated during monthly interdisciplinary team meetings. The Transitions physician supervises the interdisciplinary care team and makes recommendations based on the patient's global and medical care plan. Ideally, the primary care physician and specialist (and/or members their team) would attend these interdisciplinary meetings, but do not do so at this time. The information from the meetings is provided to the patient's physicians at regular intervals, or immediately if there is an acute issue. Care decisions are based on prognostic data and information coming in from the team about patient functional, emotional, and social status.

PROGRAM EVALUATION

Transitions was developed and implemented with the goal of reducing preventable acute care utilization for patients with chronic disease, such as HF. We measured acute care utilization and cost in patients both before and after enrollment in the Transitions program to gauge preliminary program effectiveness and sustainability. HF patients were included in the program evaluation if complete financial records were obtainable for the entire evaluation period and they were enrolled during the evaluation time frame January 2008 through December 2010. A total of 155 patients met inclusion criteria during the evaluation time frame.

Measurements and Analysis

Transitions patient data was obtained from Sharp Health-Care electronic medical records. All evaluation methods and procedures were reviewed and approved by appropriate institutional review boards before commencement of data collection.

There was no minimum length of stay (LOS) requirement for this evaluation, as the range for enrollment in Transitions is determined by patient need and varies greatly. Patients' LOS in the program was determined through retrospective electronic record review. The control time period for each patient was defined as the period that began the day before enrollment going backwards in time to the date that equaled their Transitions LOS. Acute care utilization and cost of care were thus obtained for equal periods of time before and during enrollment in Transitions.

Utilization measures include ED visits, hospital admissions, and overall inpatient and outpatient care costs. Care utilization costs included the direct and indirect costs of Sharp hospital claims and were calculated using a ratio of costs to charges (RCC) for each department that billed in the claim. Direct costs include physician, medications, labs, and other costs directly involved in care. Indirect costs include payroll, overhead, facility, and costs outside of managed care including claim expenses that Sharp pays outside providers. Costs for professional physician services performed at Sharp clinics included all office visits, labs, and any procedures done at the doctor's office. Estimated costs were calculated using a professional cost to charges ratio.

The cost of the Transitions program was calculated using both direct and indirect costs. Direct costs include salaries, benefits, mileage, communication equipment (including cell phones) and education costs of the program director, RNs, and social worker. Indirect costs include an allocation of overhead costs from the hospice program where Transitions is housed, including rent, utilities, management services, and the pre-existing phone bank. The total cost of the program during the study time was divided by the total number of Transitions patients to determine a cost per patient of \$2456, which was added to each patient's during-Transitions cost utilization. Descriptive statistics were used for all demographic data. Paired *t* tests were used to analyze each patient's admission, ED visit, and total care costs pre- and during Transitions. Chi square tests were used to analyze change in rates of hospitalization and ED visits for the total patient sample pre- and during Transitions.

Evaluation Results

Demographic characteristics for Transitions patients are listed in **Table 3**. Average LOS for Transitions patients was 165 days (approximately 5–6 months). Seventy-five

Table 3. Patient Demographics

Variable	Value	SD or Percent
Total <i>n</i> = 155		
Age at enrollment		
Mean, yr	84	SD 8.3 (Range: 45–102)
< 64, <i>n</i>	3	2
65–79, <i>n</i>	34	22
> 80, <i>n</i>	118	76
Gender, <i>n</i>		
Female	91	58.7
Male	64	41.3
Race/ethnicity, <i>n</i>		
Asian	1	0.65
Black	4	2.6
Hispanic	15	9.7
American Indian	1	0.65
Hawaiian	1	0.65
White	121	78.1
Unknown	12	7.7
Average LOS in program, <i>d</i>	165	SD 163 (Range: 2–726)
Reasons for discharge, <i>n</i>		
Transfer to hospice	116	74.8
Death at home	8	5.2
Death in a facility	9	5.8
No further care needed	3	1.9
Moved from service area	1	0.65
Discharged: other	18	11.6

percent transferred into hospice care upon discharge from the program. There was a significant decrease in hospitalization rate after enrollment in Transitions: from 32% (*n* = 49) to 17% (*n* = 26), *P* < 0.01 (**Table 4**). There was also a significant decrease ED visit rate after enrollment: from 57% (*n* = 88) to 31% (*n* = 48), *P* < 0.01. The average total cost for pre-Transitions care was \$73,045 vs. \$46,588 during enrollment, a significant decrease (*P* < 0.01).

DISCUSSION

Preliminary evaluation showed there was approximately a 50% reduction in acute care utilization after enrollment, including ED visits and hospitalizations. This was despite the advancing nature of patient's chronic disease over the mean 5-month LOS and is in direct opposition

Table 4. Utilization and Costs

	Pre-Transitions	During Transitions	P
Hospitalizations, <i>n</i>	71	33	
Hospitalizations per patient, mean (SD)	0.46 (0.84)	0.21 (0.55)	< 0.01
Hospitalization rate	32%	17%	< 0.01
ED visits, <i>n</i>	157	67	
ED visits per patient, mean (SD)	1.01 (1.3)	0.43 (0.78)	< 0.01
ED visit rate	57%	31%	< 0.01
Avg total cost of care, (SD)	\$73,025 (\$109,708)	\$46,588 (\$81,616)	< 0.01

to traditional practice outcomes, which typically involve increasing rates of acute care utilization as disease progresses [39]. Furthermore, 75% of our patient sample transitioned to hospice care, which is double the rate seen in a recent sample of Medicare beneficiaries with advanced heart failure [40]. The reductions in acute care utilization were greater than the cost of the program, providing preliminary evidence for the sustainability of the Transitions chronic care delivery model as designed. The cost savings may be an underestimate: We evaluated utilization costs pre-post intervention for each patient and did not take into consideration the expected increase in acute care utilization that is associated with traditional models of care. Economic models are currently being developed to calculate costs per hospitalization for HF patients approaching the end of life [Cassel, personal communication], and will help better estimate program cost efficiency in the future.

The new goals for health care reform have increased the opportunity and motivation to develop proactive care models that can increase the financial sustainability of organizations. Currently we are working to extend the Transitions model beyond Medicare Advantage contracts to include 4 upcoming payment model schemes: coordination of care; pay for performance; episodic care; and comprehensive care models. However, to align incentives, we may need to restructure reimbursement so that all providers benefit from cost savings, including hospitals. The concept of preventing readmission will also have to be replaced by a medical and ethical standard of preventing patients from unnecessarily being admitted to the hospital in the first place.

There are limitations to this program evaluation. This was a within-group comparison using historical controls, and qualitative data such as functional and/or psycho-

social status was not measured due to the retrospective nature of the evaluation. Anecdotally, patients, caregivers and their families have stated they are very satisfied with the program and have self-reported an increase in their ability to self-manage their HF [41]. The program is still in its formative stages and is constantly evolving as we learn what works and what doesn't for our patients based on increased knowledge and data. We are determined to continue to track our outcomes and build performance metrics into our model. Future study will compare Transitions outcomes to the general San Diego HF population, and metrics will include all-cause vs. HF-specific readmissions, rates of hospice referrals, LOS in hospice care, and patient satisfaction. We are currently conducting research that will measure quality of life in patients managed through Transitions. We are encouraged by initial successes and are currently expanding the Transitions care model to patients with dementia, COPD, advanced cirrhosis, advanced cancer, and geriatric frailty syndrome.

CONCLUSIONS

Transitions was developed as an innovative advanced chronic disease model of care that would better address the needs of patients with advanced chronic illness, and is based on 4 evidence-based pillars that address patient, family and caregiver needs during the progression of their illness. Program goals include (1) educate the patient and their family on disease process, early symptom recognition, medication management, and dietary considerations, (2) enhance coordination of care with the patient's primary care provider and specialist, (3) lead the development of a long-term care plan that aligns with patient goals of care, and (4) facilitate a smooth shift to end-of-life care for the patient and their family. Sharp Healthcare's Transitions model is consistent with the

WHO's Innovations for Chronic Illness, which includes creating a paradigm shift in chronic illness management; managing a changing health care political landscape; building integrated health care systems; aligning incentives in health care policy—including the patient and family; and using health care personnel more efficiently and effectively [42].

Traditional models of disease management no longer suit a population living longer with chronic illness. As the proportion of the population surviving into their 80s and 90s increases, there is a growing demand for health care systems to create new models of care delivery that recognize the progression of the disease, guide patients and families through the disease process, honor patient goals of care and minimize the occurrence of unnecessary adverse events. Sharp developed the Transitions program with these objectives in mind. Through its 4 evidence-based pillars, Sharp Healthcare's Transitions program aims to manage chronically ill patients while achieving improved health outcomes and lowered costs of care. Aligned with the goals of comprehensive care management, Transitions provides a potentially sustainable, innovative model of health care delivery for the advanced chronic disease population that can be replicated across similar and diverse health care organizations. Preliminary program evaluation of this multidisciplinary program shows we are accomplishing our goals in changing the traditional pathway for patients with advanced chronic disease.

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