Financial Implications of a Model Heart Failure Disease Management Program for Providers, Hospital, Healthcare Systems, and Payer Perspectives

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Although heart failure disease management (HFDM) programs improve patient outcomes, the implementation of these programs has been limited because of financial barriers. We undertook the present study to understand the economic incentives and disincentives for adoption of disease management strategies from the perspectives of a physician (group), a hospital, an integrated health system, and a third-party payer. Using the combined results of a group of randomized controlled trials and a set of financial assumptions from a single academic medical center, a financial model was developed to compute the expected costs before and after the implementation of a HFDM program by 3 provider types (physicians, hospitals, and health systems), as well as the costs incurred from a payer perspective. The base-case model showed that implementation of HFDM results in a net financial loss to all potential providers of HFDM. Implementation of HFDM as described in our base-case analysis would create a net loss of $179,549 in the first year for a physician practice, $464,132 for an integrated health system, and $652,643 in the first year for a hospital. Third-party payers would be able to save $713,661 annually for the care of 350 patients with heart failure in a HFDM program. In conclusion, although HFDM programs may provide patients with improved clinical outcomes and decreased hospitalizations that save third-party payers money, limited financial incentives are currently in place for healthcare providers and hospitals to initiate these programs. **(Am J Cardiol 2007;99:256–260)**

We undertook the present study to understand the economic incentives and disincentives for adoption of disease management strategies from the perspectives of a physician (group), a hospital, an integrated health system (IHS), and a third-party payer. We evaluated the impact of adoption costs and other key clinical and economic factors on the economic attractiveness of heart failure disease management (HFDM). We hypothesized that although HFDM is financially attractive to payers, economic disincentives exist for physicians, hospitals, and IHSs to provide HFDM in the current reimbursement environment.

Methods

A financial model was developed to compute the expected costs before and after the implementation of a HFDM program by 3 provider types (physicians, hospitals, and health systems), as well as the costs incurred from a payer perspective. A previously published meta-analysis was used as a basis for modeling the expected impact on heart failure-related hospitalizations, resulting from the implementation of a HFDM program.[1] In turn, the model assumptions regarding the structure and intensity of the HFDM program and patient characteristics were consistent with the programs included in the meta-analysis.

It was assumed that enrolled patients would have a recent HF hospitalization and have more severe symptoms (stage C/D). The HFDM program would be provided by a physician extender in a clinic setting and would include 8 clinic visits annually with a physician extender, in addition to 4 clinic visits per year with the patient's physician. Eight telephone follow-up calls would be made by the extender as part of the HFDM. The model assumed that 2 full-time and 1 part-time physician extenders would be required to provide HFDM services to 350 patients participating in the HFDM program. For simplicity, the estimates were based on 1 year of services, and it was assumed that no patient discontinued participation, including withdrawal because of death.

The provider of interest was assumed to incur the cost of the HFDM program. Base-case assumptions for the components of the program costs are provided in Table 1. Cost accounting information from the Duke University Medical Center provided the source for most unit cost estimates. Using information from previous studies that reported the actual cost of implementing the program, a start-up cost of $50,000 was estimated. This included the cost of training personnel, renovating office space, and purchasing necessary equipment and patient materials. This cost was allocated over a 3-year period, using a 5% annual interest rate. In addition, ongoing infrastructure costs were estimated at $44,000 per year to cover the costs of continuing education

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0002-9149/07/$ – see front matter
doi:10.1016/j.amjcard.2006.08.019

Table 1
Base-case assumptions for financial models

Program Costs	Estimate	Sources and Assumptions
HFDM personnel salaries with benefits	$302,500	Annual salary plus benefits of nurse practitioner
Infrastructure costs	$44,200	Duke cost accounting
Startup	$50,000	Previous studies[1]
Outpatient care		
Reimbursement for outpatient clinic visit with physician	$111	Medicare reimbursement for NC: CPT code 99215
Reimbursement for outpatient clinic visit with physician extender	$94	85% of physician reimbursement rate
Reimbursement for Heart Failure Disease Management phone calls	$0	
Inpatient care		
Variable cost for HF admission	$3,500	Duke cost accounting data
Variable cost for average telemetry admission	$8,300	Duke cost accounting data
HF admission reimbursement	$6,800	Duke cost accounting data
Average telemetry admission reimbursement	$16,000	Duke cost accounting data
Physician reimbursement for admission	$145	Medicare reimbursement for NC: CPT code 99223
Physician reimbursement for follow-up visit	$73	Medicare reimbursement for NC: CPT code 99223
Physician reimbursement for discharge	$89	Medicare reimbursement for NC: CPT code 99223

CPT = Common Procedural Terminology; NC = North Carolina.

Table 2
Results of base-case analysis for physician, hospital, and healthcare system

Variable	Before HFDM	After HFDM	Difference
Physician perspective			
Total revenue	$384,569	$573,081	$188,512
Revenue–cost*	$384,569	$205,020	$179,549
Hospital perspective			
Revenue from HF admissions	$2,570,400	$1,668,227	
Revenue from new non-HF admissions		$318,414	$583,759
Inpatient variable cost from HF admissions	$1,323,000	$858,646	
Inpatient variable cost from new non-HF admissions		$165,177	$299,176
Revenue–cost*	$1,247,400	$594,757	$652,643
Healthcare system perspective			
Total revenue	$2,954,969	$2,559,722	$395,247
Inpatient variable cost	$1,323,000	$1,023,824	$299,176
Revenue–cost*	$1,631,969	$1,167,838	$464,132

* Cost = variable cost + cost of implementing HFDM program; variable cost = 0 for physician model.

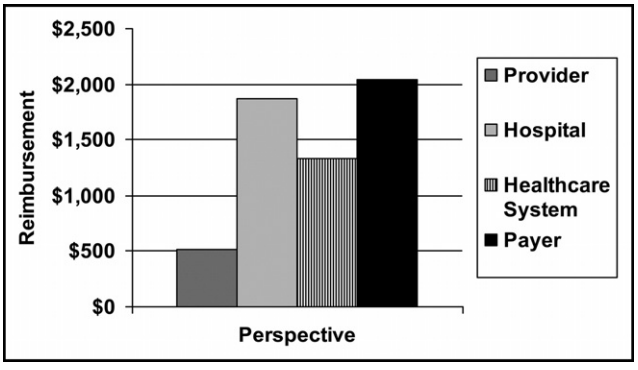

Figure 1. Reimbursement per patient required to break even for each perspective and maximum amount of reimbursement third-party payer can tolerate. *Dark gray bar,* provider; *light gray bar,* hospital; *slashed bar,* healthcare system; *black bar,* payer.

for the physician extenders, information technology (equipment and support), telephone services, and office space.

The financial models used the variable contribution margin (VCM) to account for the financial impact of changes in the inpatient care. VCM is the difference between the reimbursement for an admission and the variable cost; it is the amount remaining to pay for fixed costs. Table 1 provides estimates of the average variable cost for a HF admission, the average variable cost for an admission to a telemetry bed within a heart center, and the average reimbursement for both. The dollar amounts applied were derived from the 2003 Duke University Health System Fiscal Year (July 2002 to July 2003). At the request of Duke University Medical Center, all financial figures were multiplied by a factor to hide their true value.

The reimbursement rates for inpatient and outpatient physician services were based on the Medicare reimbursement schedule for North Carolina for 2003 and corresponded to Current Procedural Terminology codes defined by the highest complexity level of decision making. The model assumed that physician extenders would be reimbursed at 85% of the physician reimbursement fees. No reimbursement was included for telephone calls.

The model assumed that the number of physician visits remained constant after implementation of the HFDM (4/year). However, as previously stated, the number of visits to physician extenders increased from 0 to 8 visits annually after implementation of the HFDM.

The main clinical effect measured in the financial model was a reduction in the rate of hospitalizations for HF. On the basis of the results of our previous meta-analysis, the model assumed a 35.1% relative reduction in the rate of HF admissions with HFDM relative to an annual hospitalization rate of 1.08 with usual care.[1] By reducing HF admissions, a potential benefit of implementing a HFDM would be the opportunity to use hospital beds for other types of admissions and would be dependent on the proportion of days when the hospital (heart center) was operating at capacity. Using the occupancy rates at the Duke University Medical Center, the base-case analysis assumed that the beds freed