

Correlates of Caregiver Burden After Coronary Artery Bypass Surgery

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Editor's Note

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- ▶ **Background:** Coronary artery bypass (CAB) patients often rely on spouses for care and assistance during recovery after surgery. Caregiving can be stressful and meaningful depending upon the interplay of many factors not completely understood. These factors may affect the spouse caregiver's health-related quality of life (HRQL), which may impact ability to care for the CAB patient.
- ▶ **Objective:** To investigate patient-spouse caregiver relationship and role variables associated with caregiver burden during the first year after CAB surgery.
- ▶ **Methods:** Using a cross-sectional design, a convenience sample of CAB spouses was recruited at 3, 6, or 12 months. Spouses ($n = 166$) completed a survey that included perceptions of patient health status, caregiver burden and other caregiving variables, and caregiver HRQL.
- ▶ **Results:** Higher burden scores were associated with patient's gender (female), poorer patient health status, lower caregiver mental HRQL, increased personal gain, and increased caregiver competence. These correlates explained 38% of the variance in caregiver burden.
- ▶ **Discussion:** Only poorer patient health status and lower caregiver mental HRQL were supported by previous research in this population. Positive relationships between burden and caregiver competence and personal gain may be a reflection that spouse caregivers were invested and working hard. They felt satisfied from enhancement of self but were burdened from their caregiving role, providing support for a previously described two-domain caregiving model. Caregiver screening is essential to identify spouses at high risk for negative outcomes. Longitudinal research is

needed to identify the correlates and predictors most likely to influence burden and caregiver gain over time, and to more fully understand caregiving in the CAB population.

- ▶ **Key Words:** caregiver burden · health-related quality of life · objective burden · outcomes of caregiving · subjective burden

Across the lifespan, caregiving has typically occurred within the context of the family. A landmark study by Townsend (1957), *The Family Life of Old People: An Inquiry in East London*, explored the social problem of caring for the elderly at home. The findings of this study led to the coining of the term *strain of illness*, referring to the excessive physical or mental demands of caregiving imposed on the family structure or resulting in a caregiver's change in employment. Almost 50 years after Townsend's seminal work, care of the elderly—not to mention care of other family members with physical or mental health problems—continues to be a widespread, growing societal concern.

Caregiving for a disabled or ill family member is estimated to occur in over 22 million households in the United States, with over 7 million spouses, adult children, and friends serving as informal caregivers to 4.2 million

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older people. On average, these informal caregivers provide 30 to 60 hours of unpaid caregiving per week. Approximately half of these caregivers (mostly women) are 65 years old and older, and two-thirds live in the same household as the care recipient. Globally, the value of family caregiver services provided in this country, for health problems from all causes, was estimated recently at \$257 billion per year (National Council on Family Relations, 2003).

Relevant Literature

Caregiving burden is a complex, multidimensional phenomenon well-documented across the lifespan, especially with dementia. Caregiving may be quite different after an acute event such as coronary artery bypass (CAB) surgery since there is an expectation that patients will improve both symptomatically and functionally after surgery, compared to progressive downward health trajectories faced with other populations, such as patients with dementia. Two quantitative CAB studies reported that caregivers experienced low-to-moderate objective and subjective burden 1 to 6 weeks (Stolarik, Lindsay, Sherrard, & Woodend, 2000) and at 1 month and 3 months after surgery (Rankin & Monahan, 1991). Caregivers of CAB patients have reported the most burden with monitoring clinical progress, managing behavior, providing emotional support, and assuming household tasks (Stolarik et al., 2000).

Although a number of patient, caregiver, relationship, and role factors contribute to caregiver burden in other populations (see <http://www.nursing-research-editor.com> for additional information), little knowledge exists regarding the importance of these factors in the context of CAB surgery (Gilliss & Belza, 1992; Knoll & Johnson, 2000; Rankin & Monahan, 1991; Stolarik et al., 2000). Three factors (correlates) have been validated to be associated with burden in CAB caregivers, including: (a) poorer patient health status (i.e., higher New York Heart Association [NYHA] class indicating worse health status); (b) younger (<55 years) and older (>70 years) caregivers; and (c) increased caregiver mood disturbances (Rankin & Monahan, 1991; Stolarik et al., 2000). It is important to understand variables impacting caregiver burden in this population because they may be key in designing intervention programs to support CAB patients and their caregivers.

Although caregiving may be meaningful, most evidence attests to its negative impact on both physical and mental HRQL. Caregivers of CAB patients have been shown to exhibit more fear and anxiety (Gilliss & Belza, 1992), stress and uncertainty (Knoll & Johnson, 2000), anger (Gilliss & Belza, 1992; Rankin & Monahan, 1991), and depression (Clark, 2002; Rankin & Monahan, 1991). Caregivers may experience lower immune functioning, making them more susceptible to serious physical illnesses. Stressed caregivers also face significantly higher mortality risks (Beach, Schulz, Yee, & Jackson, 2000). Symptoms such as sleep deprivation, chronic fatigue, stomach problems, weight changes, hypertension, and general health deterioration have all been linked to caregiver burden (Clark, 2002; Rankin & Monahan, 1991).

Despite this evidence, there has been a growing appreciation of the positive side of caregiving. Sales (2003) voiced discomfort with the negative connotations of the term *burden* because it implies something unwanted, imposed rather than chosen, unrelentingly negative, and something a person would desire to shed and, therefore, ignores the contextual, affective, historical, and relational elements of the role that may be most central to the caregiver. As a result, by focusing only on the narrow negative aspect of burden, only half of the equation of the impact of caregiving is understood.

Indeed, caregiving does not produce solely negative outcomes because a positive impact, known as *caregiver gain*, has been documented empirically by outcomes such as increased self-esteem from fulfilling responsibilities and coping with a personal challenge, uplifts in caregiving, finding or making meaning through caregiving, personal gain (reflecting personal growth), and caregiver satisfaction (Lopez, Lopez-Arrieta, & Crespo, 2005; Rapp & Chao, 2000; Ross, Holliman, & Dixon, 2003). Therefore, the overall impact of caregiving may include positive, neutral, or negative effects on the caregiver. Recognition of such appraisals is important because not all caregivers perceive their role as stressful and, furthermore, even burdensome activities might be satisfying for caregivers.

Conceptual Framework

The theoretical underpinnings of this study were drawn from concepts related to stress, appraisal, and caregiving, as well as systems theory. The conceptual framework is intended to illustrate how the marital context of caregiving after CAB surgery (as influenced by a multitude of factors) affects caregiver appraisal positively (*gain*) or negatively (*strain*), as well as to propose relationships between these appraisals and outcomes of the caregiver, which may then influence patient recovery outcomes. The relevant terms in this framework are defined in Table 1.

When discharged home, most CAB patients have a spouse who fulfills the primary caregiving role. This *context of caregiving* is influenced by patient, caregiver, the patient-caregiver relationship, and caregiver role characteristics (e.g., patient health status, caregiver HRQL, and amount of caregiving tasks); it is further influenced by length of time in the caregiver role (hence, the 3-, 6-, and 12-month caregiver groups studied; Figure 1). *Appraisal* is used by the caregiver to evaluate subjectively the caregiving situation from a cognitive and emotional perspective. Despite the fact that appraisal can result in positive, negative, or neutral feelings, *negative appraisal* has been studied extensively in terms of the stress or strain of caregiving, commonly referred to as caregiver burden. However, *positive appraisal* occurs when caregivers perceive the situation favorably and report caregiver gain (i.e., personal gain, caregiver competence and satisfaction). These positive and negative appraisals may influence one another also.

Additionally, caregiver appraisals can influence outcomes of both the spouse caregiver and the CAB patient. Appraisal may directly affect *outcomes of caregiving* as caregivers perceive the degree to which caregiving has changed various life domains for the better or worse, such

TABLE 1. Definition of Terms

Concept	Definition
Subjective health status	Perceived health status as determined by an individual but without input about personal values (Gill & Feinstein, 1994). <i>Proxy subjective health status</i> is determined by healthcare provider, family, or significant other; based on communication by patient.
Functional status	The ability of the patient to engage in activities of daily living and other social, recreational, and vocational activities as reported by the caregiver.
Health-related quality of life (HRQL)	A measure of total well-being determined by an individual with input about personal values (Gill & Feinstein, 1994). Domains of HRQL include physical, mental, emotional or spiritual, and social.
Caregiver burden	Psychosocial or physical stress or strain attributed to caregiving responsibilities. <i>Objective burden</i> refers to the concrete activities that cause disruptions in the caregiver's life, and thus, represents the demands of the caregiving situation, including direct and indirect care (Archbold et al., 1990; Faison et al., 1999). <i>Subjective burden</i> is the degree of perceived stress in relation to the caregiving situation. Therefore, this type of burden represents the caregiver's attitudes and feelings about the difficulties of caregiving.
Outcomes of caregiving	Perceived impact of the caregiving experience on the domains of the caregiver's life, such as self-esteem; future outlook on life; relationships with family, friends, or spouse; and general health.
Anxiety	A transitory, unpleasant affective state produced by arousal of the autonomic nervous system, which fluctuates over time and varies in intensity, marked by feelings of tension or apprehension, increased heart rate, blood pressure, and gastric motility.
Depression	A subjective psychological state whereby a person reports a lowering of mood, such as feelings of sadness or hopelessness.

as general health, self-esteem, roles in life, or financial health. *Caregiver HRQL* (physical, mental, overall life satisfaction) may be affected also by caregiving appraisals, impacting physical and mental HRQL and overall life satisfaction. Recovery outcomes of the CAB patient may be affected through the impact of caregiving on the caregiver's outcomes and HRQL. As a result, principles from family systems theory apply within this framework as the CAB patient's health status and postdischarge care demands may affect the spouses' perception of the situation directly (strain or gain) and, thereby, positively or negatively

impact HRQL. In turn, the spouse's HRQL could affect his or her ability to provide quality care, potentially impacting patient recovery outcomes.

Aims of the Study

The primary aim of this study was to determine the correlates of caregiver burden after CAB surgery, controlling for time. Specifically investigated in this study was the degree to which caregiver burden was associated with (a) patient (gender, age, general health, functional status, cognitive symptoms); (b) caregiver (gender, age, education, income, HRQL, personal control and gain, caregiver competence and satisfaction); (c) relationship (mutuality, marital satisfaction and social support); and (d) role (amount and length of caregiving) factors.

Methods

A cross-sectional descriptive comparative design was used to study burden, caregiving, and HRQL outcomes between groups of CAB spouses recruited 3, 6, or 12 months after surgery. Convenience samples of spouses of first-time CAB surgery patients were recruited from three large Midwestern metropolitan medical centers. Inclusion criteria for spouses were: (a) at least 21 years of age; (b) CAB patient's legal spouse; and (c) living with patient and assuming the primary caregiver role. Using an a priori power analysis (moderate effect size = .5, $\alpha = .05$, power = .80 for the parent study to detect differences in burden between the three groups), it was calculated that a total of 159 spouses ($n = 53$ subjects per group) was needed (Halm, Treat-Jacobson, Lindquist, & Savik, in press).

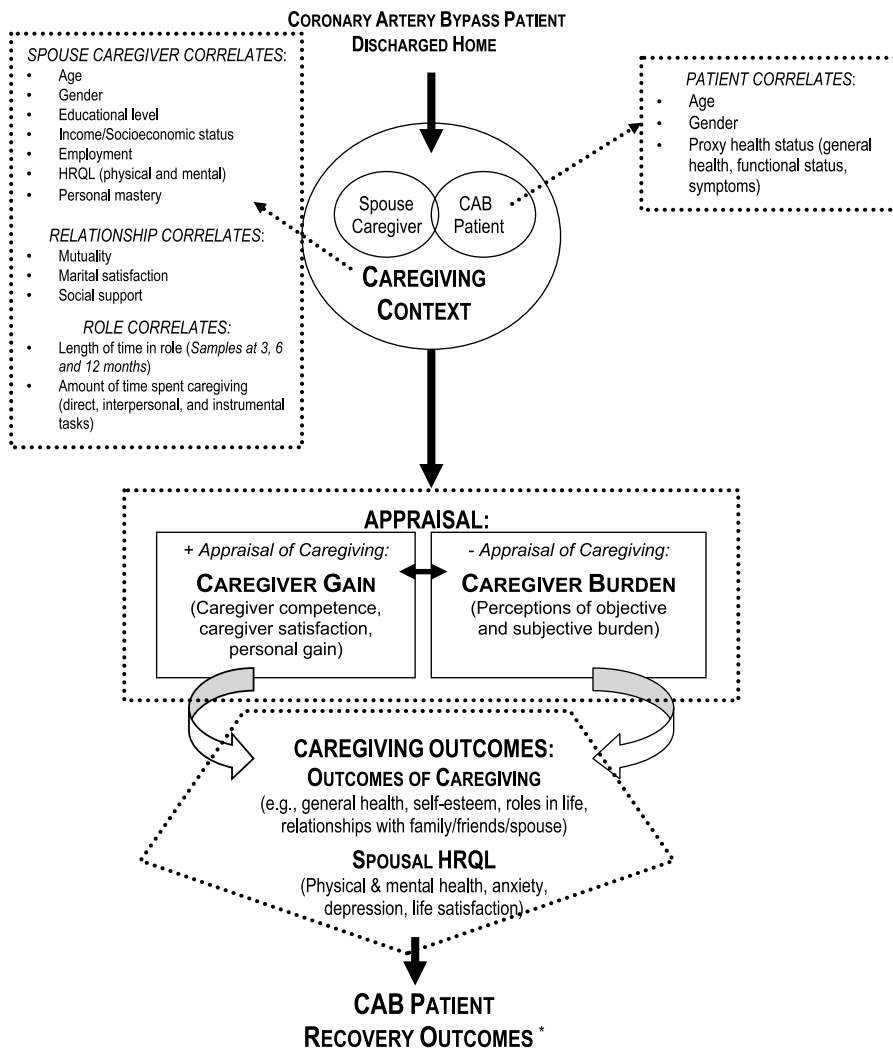
Survey Instrument

A survey was mailed to spouses who met study criteria 3, 6, or 12 months postsurgery. Caregiver burden, other variables known to be related to burden, and outcomes of caregiving were assessed using the survey. The tools selected to measure these concepts had strong psychometric properties with satisfactory reliability and validity (Table 2). The 24-page survey took about 30 to 45 minutes to complete.

Caregiving Measures

The Caregiving Burden Scale (CBS) was used to assess direct, instrumental, and interpersonal tasks. Using two separate 5-point Likert scales, 15 tasks are rated for amount of time spent (*objective burden*) and level of difficulty (*subjective burden*). Scores range from 15 to 75, with higher scores indicating greater burden (Oberst, Thomas, Gass, & Ward, 1989). As described in Table 1, caregiver burden is differentiated from anxiety or depression, other subjective emotions that are possible responses to caregiving depending upon the degree of stress or strain perceived.

The Bakas Caregiving Outcomes Scale (Bakas, Lewis & Parsons, 2001), a 15-item scale, was used to measure the impact of the caregiving on several life domains such as self-esteem, roles in life, and future outlook. Items are



* Patient recovery outcomes not measured in this study

FIGURE 1. Conceptual framework of spousal caregiving after coronary artery bypass surgery.

rated on a 7-point scale from 1 (*changed for the worst*) to 7 (*changed for the better*). Possible scores range from 15 (*worse outcomes*) to 105 (*positive outcomes*).

Variables Associated With Burden

Other variables associated with burden were surveyed. Tools were included that measured: (a) patient health status and functional status via spouse perceptions, including symptoms that are common after CAB surgery such as difficulty sleeping and neurocognitive changes; (b) caregiver variables including HRQL dimensions, personal mastery, caregiver competence and satisfaction, personal gain, and demographic characteristics; and (c) relationship and support factors of mutuality, marital satisfaction, and social support (Halm et al., in press). As described in Table 1, the term *proxy health status* will be used for the assessment of patient health status completed by spouses, whereas the more comprehensive term HRQL will be reserved appropriately for the CAB spouse’s assessment about their own health and values.

Patient Health Status Patient’s general health status was assessed through spouse proxy ratings on items from the SF-12 (Medical Outcomes Trust, Waltham, MA), the Karnofsky Performance Scale (KPS), and standardized symptom scales. Spouses rated the patient’s health on two items from the SF-12; for the first item, spouses rated their perception of the patient’s general health at the present time, and for the second item, spouses rated their perception of the patient’s health prior to surgery with the patient’s current health status. These two items were chosen because this study drew on a spouse’s perception of the patient’s health status rather than the perception of the patient. The KPS was developed as an estimate of physical state and performance, and thus, allows classification of functional impairment. A global rating scale from 0 (*moribund*) to 100 (*normal*) is used in the KPS; the lower the score, the worse the survival prospect for most serious illnesses (Karnofsky, Abelman, Craver, & Burchenal, 1948). In this study, spouses rated the patient’s level of functioning at the following three time points: just before

TABLE 2. Summary of Descriptive Statistics of Predictor Variables (n = 166)

	No. of Items	Possible Range	M (Median)	SD (Range)	Reliability	Validity
<i>Patient</i>						
SF-12 items (General population)						Content, criterion, and construct
At time of CAB surgery	3	1–5	2.3	1.1	—	
At current time (3, 6, or 12 months)	3	1–5	3.4	0.87	—	
Neurocognitive symptoms (CAB patients)	3	1–6	2.0	1–6	$\alpha = .89^*$	Content
Karnofsky Performance Scale (cancer population)	1	0–100				Content
Just before surgery			80	20–100	—	
At discharge			60	20–100	—	
At current time (3, 6, or 12 months)			90	50–100	—	
<i>Appraisal of Caregiving</i>						
Personal mastery (dementia caregivers)	7	7–49	34.7	8.0	$\alpha = .80^*$	Construct
Caregiver competence (dementia caregivers)	4	4–16	15.0	7–16	$\alpha = .75^*$	Content
Caregiver satisfaction (CAB caregivers)	3	1–10				Content and concurrent
1 week after surgery			8.0	2–10	—	
1 month after surgery			8.0	3–10	—	
At current time (3, 6, or 12 months)			9.0	3–10	—	
Personal gain (dementia caregivers)	4	4–16	12.0	4–16	$\alpha = .87^*$	Content
Caregiving Burden Scale (cancer population)	15	15–75			$\alpha = .91^*$ $\alpha = .93^*$	
Objective burden			37.0	4–67		
Subjective burden			19.0	8–51		
Total burden			27.5	16–54		
<i>Relationship</i>						
Mutuality (older caregiver population)	15	0–60	51.0	5–60	$\alpha = .96^*$	Content and construct
Marital satisfaction (general population)	3	3–21	18.0	3–21	$\alpha = .95^*$	Factor, construct, and criterion
Expressive support (dementia caregivers)	8	8–32	28.0	8–32	$\alpha = .93^*$	Content
<i>Caregiver Outcomes</i>						
SF-12 (general population)					Test–retest: .89 (PCS); .76 (MCS)	Content, criterion, and construct
Physical Component Score (PCS)	12	0–100 [†]	45.5	11.5		
Mental Component Score (MCS)	12	0–100 [†]	51.4	9.6		
State–Trait Anxiety Inventory (general population)	20	20–80	32.0	20–73	$\alpha = .96^*$	Construct
CES-D (general population)	20	0–60	7.0	0–53	$\alpha = .81^*$	Concurrent
Life satisfaction (CAB caregivers)	1	0–10			Test–retest: .70	Content and criterion
At time of surgery			7.0	1–10		
At current time (3, 6, or 12 months)			8.0	2–10		
5 years ago			9.0	3–10		
5 years in future			8.0	1–10		
Bakas Outcomes of Caregiving (stroke population)	15	15–105	62.8	10.8	$\alpha = .92$	Criterion and construct

Note. Population instrument originally developed is identified in parentheses after the name of the instrument.

CAB = coronary artery bypass; PCS = physical component score (SF-12); MCS = mental component score (SF-12).

*Cronbach's alpha coefficient obtained in current study.

[†]Normative data for general population (n = 997 men; n = 1,332 women) (Ware, Kosinski, & Keller, 1998):

–Mean PCS: 51.2 men (range 14–69) and 49.1 women (range 13–65).

–Mean MCS: 50.7 men (range 14–70) and 49.4 women (range 11–70).

surgery, at discharge, and at the present time (3, 6, or 12 months). The first two time points relied on retrospective recall of the patient's functional status, whereas the last one reflected the current perceived level of functioning (Halm et al., in press).

Spouses assessed recovery-related symptoms of difficulty with sleeping, concentrating, remembering, and word finding via standardized symptom scales. These symptoms were chosen as an adjunctive measure to the patient's health status because studies have shown higher burden for caregivers of the cognitively impaired compared to those of the physically disabled (Mastrian, Ritter, & Deimling, 1996). For these scales, the spouse rated the patient's frequency of each symptom in the last month on a 6-point Likert scale, from 1 (*not at all*) to 6 (*every day*), as utilized in the post-CABG study (Lindquist et al., 2003). Because spouses rated patients for each symptom at one point in time, it would be unexpected to find a correlation with symptoms at another measurement point. The reliability of this measurement method is supported by the findings of Bergh, Backstrom, Jonsson, Havinder, and Johnsson (2002), who asked married CAB and angioplasty patients and spouses to rate their memory, concentration, general health, social functioning, and emotional state at 1 to 2 years postprocedure. Spouse ratings did not differ significantly from patient ratings on any domain (Halm et al., in press).

Caregiver Characteristics The Pearlin Mastery Scale, comprising seven items rated on a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*), was used to measure personal self-control. Mastery scores range from 7 (*low*) to 49 (*high*), and are obtained by adding all item responses (Pearlin, Mullan, Semple, & Skaff, 1990). The Caregiver Competence Scale (Pearlin et al., 1990) was used to assess the degree that individuals ascribe ratings of competency in their caregiving role. The scale consists of four items that are rated on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much*). Possible scores range from 4 (*low*) to 16 (*high*), and are obtained by adding all responses (Pearlin et al., 1990).

As a generic measure of health status, the SF-12 was used to assess eight concepts commonly represented in widely used surveys: (a) physical functioning, (b) role-physical, (c) role-emotional, (c) mental health, (d) bodily pain, (e) general health, (f) vitality (energy/fatigue), and (g) social functioning (Ware et al., 1998). Because HRQL is a multidimensional concept, it is common to supplement a generic health status instrument such as the SF-12 with additional measures to ensure comprehensive measurement of HRQL domains.

Additional inventories for anxiety, depression, and global quality of life were used because the SF-12 does not assess every aspect of HRQL. The State-Trait Anxiety Inventory (STAI) consists of 20 items spouses use to rate how anxious they currently felt on a 4-point Likert-type scale, with possible scores ranging from 20 (*low*) to 80 (*high*); (Spielberger, Gorsuch, & Lushene, 1983). The Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item self-report measure of emotional health, was used to assess the frequency that spouses experienced a variety of depressive symptoms during the past week.

Possible scores range from 0 (*low*) to 60 (*high*). A cut-point of 16 is recommended for a positive screen for depression. Global quality of life was measured using a Cantril Ladder Scale from 1 (*minimal*) to 10 (*extreme*); (Cantril, 1965). The stem statement for this ladder was: "The top of the ladder represents the best possible life for you, while the bottom represents the worst possible life for you." This ladder convention was utilized to inquire about QOL at four different time periods: 5 years ago, at the time of surgery, at the current time, and projected 5 years in the future.

Relationship Characteristics The Mutuality Scale is a 15-item tool used to measure positive qualities of the patient-caregiver relationship, including love and affection, shared values and pleasurable activities, and reciprocity. Caregivers rated these items on a 5-point Likert scale from 0 (*none*) to 4 (*a great deal*). Scores range from 0 (*low*) to 60 (*high*) (Archbold, Stewart, Greenlick, & Harvath, 1990). As a unidimensional scale, the Kansas Marital Satisfaction Scale (KMSS) is used to measure marital satisfaction on a 7-point Likert scale. On this three-item tool, spouses rated their level of satisfaction with their marriage, their relationship with their spouse, and their husband or wife as a spouse at the present time and retrospectively at the time of their spouse's surgery. Scores range from 3 (*low*) to 21 (*high*) (Schumm, Milliken, Poresky, Bollman, & Jurich, 1983). The Expressive Support Scale measures the extent of perceived support from friends and family (other than their marital partner) with respect to their caregiving role (Pearlin et al., 1990). There are eight items in this scale, rated on a 4-point Likert scale from 1 (*strongly disagree*) to 4 (*strongly agree*). Scores ranging from 8 (*low*) to 32 (*high*) were obtained by adding all the item responses.

Procedure

After the study was approved by the institutional review board, patients who had undergone CAB surgery in the previous year were identified using a system-wide cardiac surgical database. The database was searched to identify married patients at 3, 6, or 12 months after first-time CAB surgery. The spouses of these patients were sent a letter that explained the purpose of the study, along with the survey. Return of the survey served to express informed consent. Surveys were mailed over a 4-month period at the appropriate intervals to yield the needed 159 subjects (based on a projected 40% response rate). A total of 459 surveys were distributed, with slightly more sent to eligible spouses in the 3-month group due to initial low returns. After 1 month, spouses who had not returned surveys were sent a reminder letter.

Data Analysis

Data were entered and analyzed using SPSS Version 11. After the data were analyzed for normality, descriptive statistics were used to summarize sample characteristics. A correlation matrix was then developed between total caregiver burden as the dependent variable and the independent variables identified in the conceptual model at 3, 6, and 12 months, and was then examined for significance. Those variables with $p < .10$ were considered

candidate variables for the hierarchical regression. Before constructing the full model, the correlations between the candidate variables were examined for indications of autocorrelation ($p > .6$). When autocorrelation was found, those variables most strongly correlated with burden, or of most interest to the investigator, were selected for the analysis. Scatterplots of each candidate variable with caregiver burden were also created to assess whether the associations were linear; no curvilinearity was found. A $p < .05$ was set for statistical significance.

Results

Sample Description

The total sample comprised 166 spouses, representing an overall response rate of 36%. The 3-, 6-, and 12-month cohorts comprised 57 (57/166, 34% response), 55 (55/155, 35% response), and 54 (54/138, 39% response) caregivers, respectively. The characteristics of the CAB patients and spouses are outlined in Table 3. The majority of spouses were elderly (mean age = 64.7 years, $SD = 10.4$), women (81.9%), Caucasian (98.8%), college-educated (59%), retired (51.2%), and married over 30 years (72.9%). Similarly, CAB patients were elderly (mean age = 66.8 years, $SD = 9.6$) but male (81.9%). Overall, spouses rated current health status of patients as *good*, compared with *fair* at the time of surgery. Patients did not differ significantly on the SF-12 health status, KFS, and symptom ratings given by spouses of the different time groups. However, female patients were given significantly lower recalled health status ratings by their spouses for the time of surgery ($p = .05$). Spouses also recalled that female patients had more sleep symptoms ($p = .002$) and lower functional status scores in all cohorts ($p = .03-.05$) compared with male patients. These findings suggest that, according to spouses, the female CAB patients had a lower health and functional status prior to surgery, at discharge, and currently (3, 6, or 12 months). The descriptive statistics of the instruments measured within the caregiver survey are shown in Table 3.

Correlates of Burden

The primary aim sought to determine the correlates of caregiver burden after CAB surgery, controlling for time. A hierarchical multiple regression analysis was completed to identify variables that accounted for greater caregiver burden. This model was tested by forcing groups of selected candidate variables ($p < .10$) in the respective step of the analysis. In Step 1, dummy codes for time were entered as a covariate. Entered into Step 2 were three patient variables: gender, current health status, and composite neurocognitive symptom score. For Step 3, caregiver variables were entered, including educational level, family income, perceived HRQL at time of CAB, SF-12 physical component summary (PCS) and mental component summary (MCS), CES-D, and personal mastery scores. Entered into Step 4 was mutuality, the patient-caregiver relationship variable. In Step 5, four caregiving outcomes were entered: personal gain, caregiver competence, caregiver satisfaction, and outcomes of caregiving.

TABLE 3. Characteristics of the Sample (n = 166)*

	CAB Patients	Caregivers
Age	66.8 ± 9.6 [†]	64.7 ± 10.4 [†]
Gender		
Male	136 (81.9)	30 (18.1)
Female	30 (18.1)	136 (81.9)
Educational level		
<9th Grade		6 (3.6)
No diploma (9–12)		6 (3.6)
High school graduate		54 (32.5)
Some college/AA		46 (27.7)
Bachelors+		52 (31.3)
Missing		2 (1.2)
Employment		
Full-time		45 (27.1)
Part-time		10 (6.0)
Homemaker		20 (12.0)
Retired		85 (51.2)
Other		4 (2.4)
Missing		2 (1.2)
Family income		
<\$24,999		16 (9.8)
\$25–\$39,999		40 (24.4)
\$40–\$54,999		26 (15.9)
\$55–\$74,999		26 (15.9)
>\$75,000		38 (23.2)
Missing		18 (11.0)
Ethnicity		
Caucasian		164 (98.8)
Hispanic		1 (0.6)
Asian/Pacific Islander		1 (0.6)
American Indian/Alaskan Native		0 (0)
Black or African American		0 (0)
Years married		
1–5 years		6 (3.6)
6–10 years		3 (1.8)
11–20 years		20 (12.0)
21–30 years		16 (9.6)
>30 years		121 (72.9)
Length of time in role		
3 months		57 (34.0)
6 months		55 (33.0)
12 months		54 (33.0)

Note. CAB = coronary artery bypass.

*Results reported as n (%) for all characteristics, unless otherwise noted.

[†]Mean ± SD.

TABLE 4. Hierarchical Regression Model Used to Predict Caregiver Burden: R² = 38% of Variance of Total Burden Explained

Independent Variable	Step 1: Time		Step 2: Patient		Step 3: Caregiver		Step 4: Relationship		Step 5: Caregiving Outcomes	
	B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p
Time 1	-.03 (1.95)	.77	-.03 (1.84)	.77	-.01 (1.83)	.96	-.01 (1.84)	.93	-.03 (1.72)	.78
Time 2	.001 (1.97)	.99	-.04 (1.87)	.72	.02 (1.88)	.86	.02 (1.89)	.84	-.001 (1.79)	.99
Patient gender			.17 (2.12)	.06	.21 (2.10)	.02	.21 (2.13)	.02	.23 (2.06)	.01
SF-12—Patient's current health status			-.18 (.92)	.06	-.15 (.97)	.13	-.15 (.98)	.14	-.22 (.93)	.02
Symptoms (composite)			.18 (.57)	.06	.06 (.62)	.56	.06 (.62)	.56	.02 (.58)	.80
Educational level					.01 (.81)	.91	.01 (.81)	.92	.05 (.77)	.61
Income					-.01 (.65)	.90	-.01 (.65)	.89	.03 (.62)	.77
Perceived HRQL at CAB					.02 (1.03)	.87	.01 (1.05)	.91	.01 (.97)	.94
Personal mastery					.07 (.13)	.55	.08 (.14)	.51	.06 (.13)	.63
SF-12—Physical component score (PCS)					-.05 (.10)	.69	-.04 (.10)	.72	-.06 (.09)	.56
SF-12—Mental component score (MCS)					-.38 (.13)	.01	-.38 (.13)	.01	-.39 (.12)	.01
Center Epidemiologic Studies—Depression (CES-D)					.01 (.15)	.94	.01 (.15)	.97	-.04 (.15)	.81
Mutuality							-.03 (.08)	.74	-.14 (.08)	.17
Personal gain									.29 (.31)	.004
Caregiver competence									.20 (.47)	.05
Outcomes of caregiving									-.12 (.08)	.23
Caregiver satisfaction									-.08 (.34)	.35

Note. HRQL = health-related quality of life; CAB = coronary artery bypass.

Results of the regression analysis are shown in Table 4. In Step 1 of the analysis, caregiver burden was regressed on time, and the results were not statistically significant. These results are consistent with previous findings of the parent study (Halm et al., in press) that caregiver burden was not significantly different at 3, 6, or 12 months. To examine whether patient characteristics accounted for caregiver burden, gender, current proxy health status, and a composite neurocognitive symptom score were entered simultaneously in Step 2. Results at this step indicated that caregiver burden was increased by the gender being female ($b = .21, p = .02$) and reduced by better health status of the patient ($b = -.22, p = .02$). Neurocognitive symptoms approached significance as an independent correlate, with higher neurocognitive symptoms associated with more burden ($b = .18, p = .06$). In Step 3, the caregiver characteristics of educational level, family income, perceived health at time of CAB surgery, SF-12 PCS and MCS, CES-D, and personal mastery were entered to determine whether these variables accounted for burden. At this step, results indicated that caregiver burden was reduced by higher caregiver mental HRQL scores ($b = -.38, p = .01$). The patient-caregiver relationship variables were tested in

Step 4 to determine whether mutuality accounted for burden, with no significant results identified at this step. In the final step, caregiving outcome variables (personal gain, caregiver competence, caregiver satisfaction, and outcomes of caregiving) were entered simultaneously to determine whether these variables accounted for caregiver burden. Findings at Step 5 revealed that burden was increased by higher caregiver competence ($b = .20, p = .05$) and personal gain ($b = .29, p = .004$). The full model explained a total of 38% of the variance of caregiver burden (Table 5).

Discussion

In the full model, caregiver burden was increased by poorer current proxy health status of the patient, female gender, poorer caregiver mental HRQL, higher caregiver competence, and higher personal gain. Neurocognitive symptoms approached significance as an independent correlate, with higher symptoms associated with more burden. This model explained a total of 38% variance of caregiver burden. According to the R^2 change statistics, proxy patient health status and caregiver MCS explained 14% and 11% of the

TABLE 5. Hierarchical Full Model Summary

Model	R^2	Adjusted R^2	Change Statistics			
			R^2 Change	F Change	df	Significant F Change
1: Time	.001	-.02	.001	0.06	2,115	0.94
2: Patient: Gender, SF-12 health status, neurocognitive symptoms	.14	.10	.14	5.89	3,112	0.001
3: Caregiver: Educational level, income, perceived HRQL at CAB surgery, personal mastery, SF-12 (PCS & MCS), CES-D	.25	.16	.11	2.19	7,105	0.04
4: Relationship: Mutuality	.25	.15	.001	0.11	1,104	0.74
5: Caregiving outcomes: Personal gain, caregiver competence, outcomes of caregiving, caregiver satisfaction	.38	.27	.13	5.18	4,100	0.001

Note. HRQL = health-related quality of life; CAB = coronary artery bypass; PCS = physical component score (SF-12); MCS = mental component score (SF-12); CES-D = Center Epidemiologic Studies—Depression.

variance, respectively, whereas caregiver competence and personal gain together explained 13% of the caregiver burden variance.

Two correlates, proxy patient health status and caregiver mental health, were supported by previous research. In chronic illness, researchers have documented that both total and objective burden increases as health status and functional ability decline (Lalonde & Kasprzyk, 1993). Rankin and Monahan (1991) found that NYHA class was a significant predictor of caregiver burden in spouse CAB caregivers at 3 months. With regard to neurocognitive symptoms, it is possible that patients in this sample did not have enough neurocognitive impairment to reach a threshold of increased burden. In relation to caregiver mental HRQL, researchers have documented that caregiver anxiety and depression are not only significant predictors of burden but may also affect a caregiver's ability to fulfill the caregiving role, thereby positively or negatively impacting recovery outcomes of the patient (Rankin & Monahan, 1991).

Findings related to higher burden for male caregivers differed from other studies. Other investigators have found that female caregivers (of male patients) experience more total, objective, and subjective burden (Lalonde & Kasprzyk, 1993). This trend may be due to the societal expectation (and natural predisposition) of women to find themselves in the caregiver role. One central reason why caring for female CAB patients in this study would be expected to be associated with more total burden was their poorer physical health status. Female CAB patients in this study were not only rated by their caregiving spouse to have significantly worse health status at the time of surgery (as measured by the SF-12 items; $p = .05$), Karnofsky functional status ratings were also rated significantly lower at all three time points—just before surgery ($p = .03$), at discharge ($p = .05$), and at the present time ($p = .05$). Female patients also experienced significantly more sleep symptoms than male patients did ($p = .002$). As a result of these differences in health status, female CAB patients may

not only require more care, but the assistance needed may include heavier physical tasks, such as assistance with getting out of bed and bathing—caregiving tasks that have been shown to be related to more burden (Lalonde & Kasprzyk, 1993). These findings are supported by studies that document worse health outcomes of women after CAB surgery (King, 2000). The fact that caring for female CAB patients was associated with greater burden may reflect their poorer health status, or that male caregivers were less familiar with or competent with activities required of the caregiver role.

Findings for personal gain and caregiver competence were opposite of what had been theorized. Positive appraisals of caregiving were included in the model under the hypothesis that the enhancement of self, as advocated by Pearlin et al. (1990), would mitigate caregiver burden. However, the association of greater personal gain and caregiver competence to higher burden in this study is similar to Greenberger and Litwin (2003), who found that caregiver competence of family caregivers of dependent older adults was associated not only with personal and social resources (i.e., general mastery, self-esteem, general social support) but also with more burden. Caregiver competence, formal support by healthcare professionals, and caregiver burden were also related positively with facilitation of the patient's adherence to the prescribed health regimen. These researchers hypothesized that caregivers who worked hard and were effective facilitators of health regimen adherence were more burdened as a result. These findings provide further evidence of the importance of the caregiver role and how it impacts patient health and recovery outcomes. The results of both studies point to a two-domain caregiving model in which the positive aspects of caregiving, such as personal gain, coexist with the negative aspects of role exhaustion or burden. As Greenberger and Litwin (2003) stated, "On the one hand, caregivers may be satisfied, gratified and energized through caregiving yet, on the other hand, they may experience substantial burden" (p. 339).

It could be argued that caregivers who were more competent in caregiving or who gained more personally actually stretched themselves more in their role, increasing caregiver burden. This explanation is supported by a qualitative study (Boland & Sims, 1996) which found that as caregivers became more proficient in the tasks of caregiving, they were less willing to share the care with others. Family members often perceived that other individuals were not skilled enough to provide care, or that the care would suffer if they themselves did not provide it. However, other researchers have suggested that characteristics such as personal mastery and self-esteem may influence how a person appraises the caregiving situation, and thus, associated burden (Greenberger & Litwin, 2003). In fact, such psychological qualities may help caregivers see caregiving as less stressful and therefore, value the experience as an opportunity for personal growth.

Limitations

The use of a cross-sectional convenience sample limits the generalizability of the findings because this sample may not be representative of the entire pool of CAB spouse caregivers. As a result, selection bias that may be present in the cross-sectional sample must be taken into account when interpreting the findings. Additionally, the amount of additional help caregivers were receiving was not measured. It is possible that spouse caregivers relied on the assistance of adult children, other relatives, friends, or neighbors that might have lessened perceptions of total, objective, and subjective burden. Another possible explanation is that spouses who were most burdened might not have responded to the survey, leading to sample selection bias, as reflected by relatively low burden scores.

Recommendations for Future Research

Measures of CAB patient's health status in the current study relied on the spouse's perception of health and functional status on the SF-12 and KPS, rather than on objective or self-report methods. This measurement approach could be viewed as a better fit with the conceptual underpinnings related to stress and appraisal of caregiving. In essence, what may be most important to the spouse's level of burden may lie in their perception of the patient's health status and consequential care needs. This methodological issue needs testing in future studies. Further research would be strengthened by measuring subjective perceptions of patient health with objective measures to validate the weight of their impact on caregiver burden.

Conclusion

In the current study, caregiver burden of CAB spouses was associated with patient gender (female), poorer proxy patient health status, lower caregiver mental HRQL, increased personal gain, and increased caregiver competence. These five correlates explained 38% of the variance in caregiver burden. Caregiver screening is essential to identify spouses at high risk to enable nurses to link spouses to available resources. The positive relationships between burden and caregiver competence and personal gain may be a reflection that spouse caregivers were

working hard, and although they felt satisfied from enhancement of self, they were still burdened from their caregiving role. Therefore, this study provides further support of a two-domain caregiving model suggested by Greenberger and Litwin (2003). Longitudinal research is needed to discern those correlates and predictors that are most likely to influence burden at various time points, as well as to more fully understand the interplay of positive and negative aspects of caregiving in the CAB population. ▀

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