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Definitions

• **Research** – systematic inquiry that uses orderly, disciplined methods to answer questions or solve problems

• **Evidence Based Practice (EBP)** – the use of the best clinical evidence in making patient care decisions

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<td>The literature review discusses relevant studies that have been conducted in the area of this study. A statement of the specific goals or purpose of the study often follows the review.</td>
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<td><strong>Method</strong></td>
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Clinical Nursing Research
An International Journal

Self-Care and Health Outcomes of Diabetes Mellitus

MinKyoung Song¹, Sarah J. Ratcliffe¹, Nancy C. Tkacs¹, and Barbara Riegel¹

Abstract
Studies show that self-care improves diabetes mellitus (DM) outcomes; however, previous studies have focused on self-care maintenance, and little is known about self-care management. The objective of this study is to examine the influence of DM self-care maintenance and management on number of hospitalizations and hospitalization days. A cohort design with secondary analysis of data from the Health and Retirement Study 2002-2004 was used. Data from 726 adults with DM were analyzed with logistic regression and negative binomial regression adjusting for covariates. Self-care maintenance and management were significant determinants of hospitalization outcomes. Establishing a goal for HbA1c (self-care management) and eating ≥2 snacks or desserts per day (self-care maintenance) were associated with a decrease in hospitalizations (IRR = 0.860, p = .001; IRR = 0.914, p = .043, respectively). DM self-care maintenance and management influence health outcomes but in different ways. These data provide evidence that both elements are needed in the education of patients about DM.

Keywords
diabetes mellitus, self-care, health outcomes

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Introduction

Diabetes mellitus (DM) is a chronic and debilitating illness that affected approximately 26 million people aged 20 years or older in the United States alone in 2010 (Centers for Disease Control and Prevention [CDC], 2011). Total DM prevalence is projected to increase from 14% in 2010 to 21% of the U.S. adult population by 2050 (Boyle, Thompson, Gregg, Barker, & Williamson, 2010). The increase in DM is particularly significant because its effects on the micro- and macro-vascular system (Saydah, Fradkin, & Cowie, 2004) make it a major risk factor for cardiovascular disease (American Diabetes Association, 2010). Approximately two thirds of deaths among persons with DM is due to cardiovascular diseases (National Diabetes Data Group, 1995).

Effective self-care has been shown to improve health outcomes in persons with DM. The routine self-care behaviors involved in treatment adherence have been shown to positively influence glycemic control and result in fewer cardiovascular complications (Skelly, Leeman, Carlson, Soward, & Burns, 2008; Sousa, Zauszniewski, Musil, Price Lea, & Davis, 2005). These behaviors also have been shown to positively influence quality of life, health care costs, and perceived health in persons with DM (Balkrishnan et al., 2005; Davis, Bruce, & Davis, 2007; Martin et al., 2006; Rubin & Peyrot, 1999; Sokol, McGuigan, Verbrugge, & Epstein, 2005; Tillison & Smith, 1996; Toljamo & Hentinen, 2001a, 2001b).

In addition to routine treatment adherence behaviors, decision-making or “problem-solving” behaviors directed at maintaining appropriate blood glucose levels are also thought to reduce long-term complications of DM (Koro, Bowlin, Bourgeois, & Fedder, 2004; Thorne, Paterson, & Russell, 2003; Whittemore, D’Eramo Melkus, & Grey, 2005). Previous studies (Herzog, Bradish, Rodger, & Rybinsky, 1999; Paterson & Thorne, 2000) supported the importance of a dynamic process of reacting to bodily cues in DM self-care. Hernandez et al. (1999) reported that enhanced awareness of contextualized (specific to a patient’s life circumstances) and unique (individualized) signs and symptoms of DM may lead to better self-control of glucose levels. Paterson and Thorne (2000) further demonstrated that the efficacy of self-care decision making is affected by a patient’s familiarity with situation or causes that can affect their glucose levels. There is a growing body of research examining how these behaviors influence health outcomes for patients with DM. Investigators have examined the influence of patient problem solving on: (a) physiological outcomes such as glycosylated hemoglobin (HbA1c), non-high-density lipoprotein cholesterol (Glasgow, Fisher, Skaff, Mullan, & Toobert, 2007; Hill-Briggs et al., 2007), (b) treatment adherence such as diet or physical activity (Glasgow et al., 2007; Hill-Briggs et al., 2007), and (c) psychosocial outcomes such as depressive symptoms (Elliott, Shechuk, Miller, & Richards, 2001; Hill-Briggs et al., 2006).

However, there have been very few studies that examine how decision-making or problem-solving behaviors influence health care resource utilization in patients with DM.

In the current study, we focused on examining how DM self-care, including decision-making or problem-solving behaviors that are a part of self-care, affects resource utilization by employing a model that accounts for problem-solving behaviors as well as routine DM self-care behaviors such as treatment adherence. Specifically, we focused on patient problem-solving behaviors related to immediate self-care action(s) on a patient’s recognition of DM signs and symptoms of acute hyperglycemia and hypoglycemia, to determine whether those behaviors influence the number and length of hospitalizations over and above treatment adherence.

The model we used was based on a situation-specific theory developed by Riegel and Dickson (2008), who used the terms self-care maintenance and self-care management, respectively, to distinguish between routine and nonroutine or situational self-care behaviors (such as problem solving or decision making) of persons with heart failure (Riegel & Dickson, 2008). Self-care maintenance consists of symptom monitoring and treatment adherence, whereas DM self-care management refers to nonroutine decision-making or problem-solving processes (and subsequent behaviors) performed in response to signs and symptoms. Self-care management includes five stages: (a) recognizing signs and/or symptoms, (b) evaluating signs and/or symptoms, (c) deciding to take action, (d) implementing treatment, and (e) evaluating treatment effectiveness (Riegel & Dickson, 2008; Song, 2010).

Purpose of the Study

The aim of the current study was to add to our understanding of how self-care affects the health outcomes of DM by empirically evaluating the influence of
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**Method**

**Data Sources**

The data for this study were obtained from the Health and Retirement Study (HRS, n.d.). The HRS is sponsored by the National Institute on Aging and undertaken by the Social Research Institute at the University of Michigan (Juster & Szanton, 1995). The HRS conducts biennial surveys of samples of the U.S. population age 50. Each sample is selected under a multistage area probability sample design; the sampling strategy is consistent over time.

**Study Design**

The current study used a cohort design with secondary analysis of the HRS data. Three years of HRS data were used—2002 HRS database, 2003 Diabetes Study, and 2004 HRS database. Household identification number (HHID) and person number (PN) were used to identify and match participants across the three HRS data sets. The study was approved by the University of Pennsylvania’s institutional review board.

**Sample**

The 2002 HRS study sampled all adults in the contiguous United States who were born before 1948 and who resided in households. Institutionalized persons (e.g., those in prisons, jails, nursing homes, long-term or dependent care facilities) were excluded from the survey population. However, enrolled individuals who moved from a household into an institution were followed over time. Telephone or face-to-face interviews were conducted for the 2002 and 2004 HRS studies. In October 2003, a supplemental mailed survey on DM was sent out in two mailings to the HRS respondents who reported having DM in the 2002 HRS. The HRS 2003 Diabetes Study was conducted with the purpose of collecting self-reported questionnaire data on aspects of treatment and self-care of DM. The questions asked in the 2002 and 2004 HRS studies were not repeated in the HRS 2003 Diabetes Study. A clinical biomarker of glycemic control, HbA1c, was collected through at-home HbA1c kits, but it was available on only 64.9% of those who completed the mailed surveys. Thus, these HbA1c data were not used in this study. Most interviews were conducted in English; however, Spanish translated questionnaires and Spanish interviews with a bilingual interviewer were provided for Spanish-speaking participants.

**Figure 1: Study sample flow**

Note: HRS = Health and Retirement Study; SCMAng = self-care management; SCMAn = self-care maintenance.

| People who participated in the 2002-2004 HRS Study (n=1,785) | People who reported having type 1 diabetes or missing data (n=276) |
| People who reported having type 2 diabetes in the 2003 Diabetes Study (n=1,209) | People who interviewed by proxy (n=140) |
| People who were interviewed directly (other than by proxy) (n=1,369) | People who have missing data on SCMAng/SCMAn/health outcomes (n=726) |

The purpose of collecting self-reported questionnaire data on aspects of treatment and self-care of DM. The questions asked in the 2002 and 2004 HRS studies were not repeated in the HRS 2003 Diabetes Study. A clinical biomarker of glycemic control, HbA1c, was collected through at-home HbA1c kits, but it was available on only 64.9% of those who completed the mailed surveys. Thus, these HbA1c data were not used in this study. Most interviews were conducted in English; however, Spanish translated questionnaires and Spanish interviews with a bilingual interviewer were provided for Spanish-speaking participants.

Figure 1 illustrates the study sample flow of the HRS data from the year 2002 to 2004 in detail. The initial sample used in this study comprised 1,785 adults with DM who participated in all three surveys. To obtain a homogeneous sample, we focused on type 2 diabetes mellitus (T2DM). Initially, 1,509 participants from the 2002 sample were selected on the basis of having T2DM (64.5%). Of these 1,509 persons, 1,369 were selected for analysis on the basis of having responded directly to the questionnaires rather than by proxy. The final sample (n = 726) was selected from those 1,369 participants if they had no missing data on the main interest variables of this study: self-care maintenance, self-care management, and health outcomes. A sensitivity analysis comparing the final sample (n = 726) to the original sample (n = 1,369) was
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Variables and Measurements

Main independent variables. Twelve items from the 2003 Diabetes Study survey were grouped into two conceptual domains (DM self-care maintenance and DM self-care management). The grouping of these items was informed by the situation-specific theory of self-care (Riegel & Dickinson, 2008), refined and validated with an expert in self-care.

DM self-care maintenance. To clearly understand the relationship between DM self-care management/problem-solving behaviors and health outcomes, it was necessary to isolate and control for the influence of the DM self-care maintenance variables of adherence and monitoring. A group of DM self-care maintenance items were identified in the areas of diet (four items), self-monitoring of blood glucose (one item), and use of medications (one item). These six items are listed in the appendix. To allow the item responses to be grouped, participants’ responses were scaled one to seven on the basis of how many days during the previous week they had performed these activities and responses were added.

DM self-care management. Items reflecting DM self-care management addressed sign/symptom recognition (two items), treatment implementation (three items), and treatment evaluation (one item). These six items are listed in the appendix. The data collected in the HRS study were not originally intended to be used to measure self-care management, and so the original HRS scale scoring was modified to better capture the decision-making processes inherent in self-care management. For example, the sign/symptom recognition items were coded on a 2-point scale (0 = no symptom recognition, 1 = symptom recognition) to capture the ability of the respondent to recognize signs and symptoms. One of the items reflecting treatment implementation was coded on a 5-point scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = very often). The other two could not be scored 0-5, so they were coded, 0 = no treatment implementation, 2 = sometimes, and 5 = always, to make the scales comparable. The item reflecting treatment evaluation was coded as 0 = not sure, 3 = no, or 5 = yes.

Dependent variables. Data from the 2004 HRS data set were used to measure the health outcome variables of (a) number of hospitalizations and (b) number of days of hospitalization since the patients’ previous interview. Hospitalization was assessed by asking “[Since the last interview/in the last 2 years], have you been a patient in a hospital overnight? [Yes/No]. The number of hospitalizations was measured by asking: “How many different times were you a patient in a hospital overnight [since the last interview/in the last 2 years]?” Number of days of hospitalization was assessed with this question: “(Altogether) how many nights were you a patient in the hospital [since the last interview/in the last 2 years]?”

Covariates. Covariates adjusted in the analysis included sociodemographic variables (age, gender, race/ethnicity, education, marital status, and employment), the total number of coronary conditions, health perceptions, and DM-related characteristics (duration of DM, main DM health care provider, duration of care from the main DM health care provider, and types of medication). Health perceptions were assessed by asking “Would you say your health is excellent, very good, good, fair, or poor?” Data on sociodemographic variables were obtained from the 2002 HRS study, and data on DM-related characteristics were obtained from the 2003 Diabetes Study.

Data Analysis

Descriptive statistics (e.g., mean, frequency, and variance) and histograms were generated and used to examine outliers and make transformations to normality as necessary. To examine the relationship between DM self-care and health outcomes, multivariable analyses were conducted based on the distribution patterns of health outcome variables: hierarchical backward stepwise logistic regression with hospitalization as a binary variable and generalized linear modeling with negative binomial distribution and log-link for number of hospitalizations and number of days of hospitalization. For the logistic regression, the significance of each model block was assessed using the change in $\chi^2$-statistics/$R^2$-statistics and associated $p$ values, whereas the significance of individual model factors was assessed using odds ratios (OR), 95% confidence intervals (CI), and associated $p$ values. For the generalized linear modeling, the significance of individual model factors was assessed by incidence rate ratios (IRR), 95% confidence intervals (CI), and associated $p$ values. The ACC (Alliance information criterion) and BIC (Bayes information criterion) along with residual plotting were used to test and optimize model fit (Hardin & Hilbe, 2007). Statistical analyses were conducted with SPSS...
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version 17.0 (Chicago, IL) for logistic regression and STATA version 11.0 (STATA Corp, College Station TX, 2009) for generalized linear modeling. Statistical significance was determined at the level of $p < .05$. Corrections for multiplicity were applied as necessary.

**Results**

**Sample Characteristics**

The study participants were predominantly non-Hispanic White (71.5%), and approximately half of the participants were female (48.5%). The ages ranged from 42 to 95 years ($M \pm SD$: 66.78 ± 8.54). Most had at least 12 years of education (71.2%), were married (65.0%), and were retired (51.7%). The mean number of years the participants had DM was 13.41 (±11.18) years, and most were taking oral medications (64.0%). Most participants were seeing a general practitioner as their main DM health care provider (HCP; 76.5%). The majority (53.5%) had seen their DM HCP for longer than 5 years (Table 1).

Out of our final sample, 36.8% ($n = 459$) were hospitalized at least once, and the mean number of hospitalizations was 0.65 ± 1.18. Among those who were hospitalized at least once, the mean number of days of hospitalization was 3.83 ± 10.7. In terms of self-care maintenance, 88.3% ($n = 641$) of participants took all doses of insulin/DM pills everyday, 58.7% ($n = 426$) of participants checked their blood sugar as recommended 7 days per week. In terms of self-care management, more participants reported recognizing symptoms of hyperglycemia ($n = 305$, 58.3%) than hypoglycemia ($n = 114$, 16.8%). Furthermore, a greater percentage of participants reported checking their blood sugar as a result of recognizing symptoms of hyperglycemia (94.9%) than as a result of recognizing symptoms of hypoglycemia (87.7%).

**Modeling of Hospitalizations and Number of Days Hospitalized**

Hospitalization as a binary variable. Adjusting for sociodemographic variables and DM-related characteristics, one self-care maintenance item—eating five or more servings of fruits and vegetables per day—was significant in determining the likelihood of being hospitalized (Odds ratio

| Table 1. Sociodemographic/DM-Related Characteristics |
|-------------|-----------------|
| Variable    | $M \pm SD$ or % |
| Sociodemographics |          |
| Age (years)   | 66.78 ± 8.54   |
| Gender        | Male           |
| Race/ethnicity| Hispanic       |
|               | Non-Hispanic White | 9.4  |
|               | Non-Hispanic Black | 71.5 |
|               | Non-Hispanic Other | 16.5 |
| Education     | 0-8 years      |
|               | 9-11 years     |
|               | 12 years       |
|               | College        |
|               | Postcollege    |
| Marital status| Married        |
|               | Unmarried*     |
| Employment    | Employed       |
|               | Unemployed     |
|               | Retired        |
|               | Homemaker      |
| DM-related characteristics |          |
| Weight        | 198.92 ± 42.52 |
| Duration of having DM | 13.41 ± 11.18 |

Note: Final sample, $N = 726$. DM = diabetes mellitus; SD = standard deviation; HCP = health care provider; NP = nurse practitioner; PA = physician assistant. Valid percentages were reported because of missing data and the variable least recorded in the data set was "Duration of having diabetes" (12.5%).

*Unmarried includes separated, divorced, never married, and widowed.
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Table 2. Generalized Linear Modeling of Number of Hospitalizations

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Adjusted model*</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hospital stays</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days eat 3+ servings of snack or dessert</td>
<td>0.914</td>
<td>[0.837, 0.997]</td>
<td>.043</td>
</tr>
<tr>
<td>Check your blood sugar if high symptoms</td>
<td>1.105</td>
<td>[1.006, 1.214]</td>
<td>.037</td>
</tr>
<tr>
<td>Have goal/target for HemoglobinA1c</td>
<td>0.860</td>
<td>[0.788, 0.938]</td>
<td>.001</td>
</tr>
<tr>
<td>Comorbid conditions</td>
<td>1.314</td>
<td>[1.147, 1.504]</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Health perception</td>
<td>0.893</td>
<td>[0.751, 1.062]</td>
<td>.201</td>
</tr>
</tbody>
</table>

Note: IRR = incidence rate ratio; CI = confidence interval, p ≥ .05 level for the adjusted model.

Adjusted for sociodemographic and diabetes mellitus-related characteristics, comorbid conditions, and health perception.

[OR] = 0.901, p = .042, Model $\chi^2 = 83.348, p < .001$. In the adjusted model, each 1-day increase in eating fruits and vegetables was associated with a 10% decrease in the likelihood of being hospitalized. None of the DM self-care management items significantly influenced whether a hospitalization occurred.

Number of hospitalizations. Table 2 presents an adjusted model for estimating the impact of self-care maintenance and management on the number of hospitalizations. Having a goal or target for HbA1c and eating two or more snacks or dessert foods per day were associated with a decrease in the incidence rate of hospitalization (IRR = 0.860, p = .001; IRR = 0.914, p = .043, respectively). Checking blood sugar when high blood sugar symptoms were present was associated with an increase in the incidence rate of hospitalization (IRR = 1.105, p = .037).

Number of days hospitalized. Table 3 presents an adjusted model for estimating the impact of self-care maintenance and management on the number of days patients were hospitalized. Having a goal or target for HbA1c was associated with fewer hospitalization days (IRR = 0.728, p < .001). Following doctors’ advice on recommended frequency of blood-sugar testing was associated with an increase in the number of days patients were hospitalized (IRR = 1.70, p = .016), whereas checking blood sugar on recognizing symptoms of low blood sugar (IRR = 0.832, p = .033) was associated with a decrease in the number of days patients were hospitalized.

Table 3. Generalized Linear Modeling of Number of Days Hospitalized

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Adjusted model*</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of days hospitalized</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days test blood sugar as recommended</td>
<td>1.170</td>
<td>[1.030, 1.329]</td>
<td>.016</td>
</tr>
<tr>
<td>Check your blood sugar if low symptoms</td>
<td>0.832</td>
<td>[0.702, 0.966]</td>
<td>.033</td>
</tr>
<tr>
<td>Have goal/target for HemoglobinA1c</td>
<td>0.728</td>
<td>[0.629, 0.843]</td>
<td>.001</td>
</tr>
<tr>
<td>Comorbid conditions</td>
<td>1.646</td>
<td>[1.40, 1.934]</td>
<td>.002</td>
</tr>
</tbody>
</table>

Note: IRR = incidence rate ratio; CI = confidence interval, p ≥ .05 level for the adjusted model.

Adjusted for sociodemographic and diabetes mellitus-related characteristics, comorbid conditions, and health perception.

Discussion

To the best of our knowledge, this is the first empirical investigation of the relationship between specific DM self-care maintenance and management behaviors and health care resource utilization. The results of our study show that the two components of DM self-care influence health outcomes, albeit in different ways.

Diabetes Mellitus Self-Care Maintenance and Health Outcomes

Our findings demonstrate a positive relationship between DM self-care maintenance, specifically eating fruits and vegetables, and a decrease in the likelihood of being hospitalized. Surprisingly, we also found that a negative DM self-care behavior, eating snacks and desserts, was associated with a decrease in the number of hospitalizations. This result appears to be counter-intuitive as it shows a beneficial health outcome from a negative behavior. However, we speculate that participants in this study who reported eating snacks or desserts may have done so judiciously to keep their blood glucose levels within the normal range. In addition, some participants may have been following insulin-dosing regimens and therefore consumed snacks as part of their treatment schedule. If detailed information on the quantity and types of snacks and desserts is added in future surveys to data on the frequency of
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when these snacks and desserts are consumed, it may show that for at least some patients increased frequency in the consumption of snacks and desserts reflects a conscious and judicious control of diet for the purpose of maintaining glucose control.

Another interesting result of this study that has not been addressed in previous DM studies is that participants who tested their blood sugar more frequently had an increase in the number of days they were hospitalized. On the surface, this is another finding that seems counterintuitive—but this may be due to a confusion of correlation and causation. That is, it may not be that more frequent testing of blood sugar leads to poorer health outcomes but that as DM patients become more ill (longer hospital stays), they stick to self-care recommendations more closely and thus check their blood sugar more often. A study examining heart failure self-care supports this hypothesis. Riegel, Driscoll, et al. (2009) found that as heart failure patients became more ill, they followed self-care recommendations more diligently.

Diabetes Mellitus Self-Care Management and Health Outcomes

The results of this study indicate that when individuals with DM have a goal/target for HbA1c, they have fewer hospitalizations and a decrease in the number of days hospitalized. No previous studies have directly examined the link between goal-setting and health care resource utilization; however, since understanding what HbA1c means is presumed to be a prerequisite for a patient to have an HbA1c goal or target, a study by Beard, Clark, Hurel, and Cooke (2009) may be instructive; they reported that patient understanding of HbA1c was associated with better HbA1c levels. Taken together, the finding of the current study and the results of Beard et al. (2009) suggest that understanding of HbA1c and setting HbA1c goals may both influence patient decision-making processes as they engage in self-care.

Two additional and interesting findings—which have not been addressed in previous studies—are that (a) individuals who check their blood sugar when they have symptoms of low blood sugar were more likely to have fewer days of hospitalization and, conversely, (b) individuals who checked their blood sugar when they had symptoms of high blood sugar were more likely to have more hospitalizations. These findings are particularly interesting, given that, our descriptive analysis showed that hyperglycemia was easier to recognize than hypoglycemia and that more participants reported checking their blood sugar for symptoms of hyperglycemia than for hypoglycemia. These findings support those by Schopse, Geddes, and Frier (2010) who reported that patients with type 2 DM noticed symptoms of hypoglycemia relatively rarely, even among those being treated with insulin (9.8%). An explanation may be that although patients are less likely to recognize symptoms of hypoglycemia, when hypoglycemia does occur, they begin engaging in compensatory behaviors more quickly than when symptoms of hyperglycemia occur. Unfortunately, there is little literature that compares patient recognition of symptoms of hyperglycemia and hypoglycemia. Our findings suggest that a more comprehensive evaluation of patient symptom monitoring and subsequent responses would help DM researchers and clinicians to provide more effective guidance.

An alternative explanation of these findings could be that the self-care management items used to measure patient responses do not fully capture the range of possible patient responses to their symptoms. For example, simply asking whether a patient checked his or her blood sugar may not capture other compensatory actions a patient might take. Patients may have available relatively uncomplicated compensatory responses to hypoglycemia (such as eating candy to increase their blood sugar when they experience hypoglycemic symptoms), which could help explain why patients who check for symptoms of hypoglycemia have better results than those who check for symptoms of hyperglycemia. What is clear is that the current data are insufficient to explain the relationship between these self-care management items and the measured health care outcomes. Longitudinal and mixed-methods studies are needed to understand these issues better.

Limitations

There were some limitations in our study. First, there were too few items available in the data set to capture the concepts of DM self-care maintenance and management comprehensively. Second, this is a secondary data analysis, and in the end our analysis was limited to some degree by the fact that the original questionnaires were not designed with the intent of measuring self-care maintenance and management. Third, although this study used a nationally representative data set, we were unable to compensate for various geographic and race group differences. Guidelines from the HRS suggest that data from different years be weighted separately, but we combined data from different years, so they could not be weighted separately. Fourthly, the health outcome variables measured—number of hospitalizations and number of days of hospitalization—might have included hospitalizations
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for reasons other than DM and its related complications. Thus, it is possible
that other factors influenced the number of hospitalizations and days hospi-
talized. Further research, where the hospitalizations measured include only
DM-related admissions, would be needed to strengthen our findings about
the impact of DM self-care on health outcomes. Last, there may have been
an undersampling of very ill individuals with DM in our study. The HRS
samples noninstitutionalized, community-dwelling individuals and indi-
viduals who moved from a household into an institution during the period
of data collection. Thus, persons who were hospitalized or living in long-
term or dependent care facilities at the study’s outset were excluded from the
sample. Care should be taken when generalizing the findings of this study—
particularly to the sickest of DM patients.

Application

The findings of the current study have two implications for clinical practice
with DM patients. First, nurses and other clinicians must recognize that it is
not sufficient to educate patients about self-care maintenance or treatment
adherence and that it is important for clinicians, and researchers to increase
their focus on understanding and educating patients about DM self-care man-
age. In particular, educating patients on actively engaging in sign/symptom
monitoring—as an initial step in the decision-making process of
self-care—is important to achieve better health outcomes. Emphasizing a
patient’s immediate self-care action(s) on recognition of DM signs and
symptoms through sign/symptom monitoring will be an important compo-
nent of DM education in addition to other problem-solving behaviors.
Second, setting goals is a particularly important component for effective DM
self-care. It is important for health care professionals to help patients identify
specific and appropriate goals for DM self-care/disease management, and
clinicians and patients should discuss and adjust those goals on an ongoing
basis. These discussions provide valuable feedback to patients as well as clini-
cians about the outcomes of disease management.

In addition, future research is needed to strengthen our findings and
apply them to DM clinical practice. Particularly, the development of a
DM-specific self-care instrument would support a robust analysis of DM
self-care practices (one that is not limited to secondary data analysis).
Through the development of such research tools, and research conducted
using such tools, clinicians will be able to provide more tailored guidance
to DM patients.

Appendix

The Conceptual Domains of DM Self-Care and Questions

<table>
<thead>
<tr>
<th>Conceptual domains</th>
<th>HRS questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet</td>
<td>Follow a healthful eating plan</td>
</tr>
<tr>
<td></td>
<td>Eat five or more servings of fruits and vegetables</td>
</tr>
<tr>
<td></td>
<td>Eat high fat foods such as red meat or full-fat dairy products</td>
</tr>
<tr>
<td>Self-monitoring of</td>
<td>Test your blood sugar as often as your doctor has recommended</td>
</tr>
<tr>
<td>blood glucose</td>
<td>Take all your recommended doses of insulin or number of diabetes pills</td>
</tr>
<tr>
<td>Use of medications</td>
<td>How many days in the past month have you had symptoms of low blood sugar, such as sweating, weakness, anxiety, trembling, hunger, or headache?</td>
</tr>
<tr>
<td></td>
<td>How many days in the past month have you had symptoms of high blood sugar, such as feeling thirsty, dry mouth, and skin, increased sugar in the urine, less appetite, nausea, or fatigue?</td>
</tr>
<tr>
<td>Self-care</td>
<td>How often do you bring up with your doctor any information you’ve heard or seen that might affect your treatment?</td>
</tr>
<tr>
<td>implementation</td>
<td>Do you check your blood sugar when you get these low blood sugar symptoms?</td>
</tr>
<tr>
<td></td>
<td>Do you check your blood sugar when you get these high blood sugar symptoms?</td>
</tr>
<tr>
<td>Treatment</td>
<td>Do you have a goal or target for what you would like your HemoglobinA1c level to be or below?</td>
</tr>
<tr>
<td>evaluation</td>
<td>-</td>
</tr>
</tbody>
</table>
Identifying Research Articles

Declaration of Conflicting Interests
The authors declared no potential conflicts of interest with respect to the authorship and/or publication of this article.

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References


Bios
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Barbara Riegel, DNSc, RN, FAAN, FAHA, is a professor, School of Nursing, University of Pennsylvania and director of the Biobehavioral Research Center.
Identifying Research Articles

How to Find & Identify Research Articles

Where Can You Find Research Articles?

1. GHSON Print Journal Collection — We have a number of journals that focus on research. Many of the other journals have a research section per issue*. Some journals to look at are:
   - Applied Nursing Research
   - Clinical Nursing Research
   - Journal of Nursing Scholarship
   - Journal of Professional Nursing
   - Nurse Education Today
   - Nursing Ethics
   - Nursing Outlook
   - Nursing Research
   - Nutrition in Clinical Practice*
   - Oncology Nursing Forum (directed to online research articles)
   - Perspectives in Psychiatric Care*
   - Psychiatric Services*
   - Simulation in Healthcare

2. OSF Online Evidence Based Journal Titles
   - Clinical Nurse Specialist
   - Clinical Nursing Research
   - Evidence Based Nursing
   - Journal of Nursing Quality Care
   - *Journal of Nursing Scholarship
   - *Journal of Nursing Research
   - Nurse Researcher
   - *Nursing Research
   - Western Journal of Nursing Research
   - Worldviews on EBN
   - *Also available in print at GHSON

3. OSF Research Databases
   - AHRQ — Agency for Healthcare Research & Quality
   - National Clearinghouse Guidelines
   - CINAHL — Cumulated Index to Nursing and Allied Health Literature
   - Cochrane Reviews
   - Clin-e-guide
   - Mosby’s Nursing Consult
   - PUBMED

4. Google Scholar is another place to search for research and scholarly articles:
   - www.scholar.google.com

http://www.grahamschoolofnursing.org/Library/Guides.html
Finding Research Articles in the SON Library

• Print Journal Collection:
  - Applied Nursing Research
  - Clinical Nursing Research
  - Journal of Nursing Scholarship
  - Journal of Professional Nursing
  - Nursing Outlook
  - Nursing Research
  - Nutrition in Clinical Practice*
  - Perspectives in Psychiatric Care*
  - Psychiatric Services*
  - Simulation in Healthcare
Finding Research Articles in the SON Library

- **Browsing** the journals in the library is a good way to come up with a research article if your topic is very broad, such as OB or Psych, or if you just need a research article but have not determined a topic yet.

- **Searching the databases** is more helpful if you already have a specific topic or topics assigned.

- Some assignments simply require a research article to be included. It’s often most effective to find a research article on the primary or broadest topic, then use other sources for additional, more specific subtopics that you can then apply to the information in the research article.
What’s an acceptable research resource for this:

• Course?
• Assignment?
• Instructor?
Searching CINAHL Plus with Full Text

- **Cumulated Index to Nursing and Allied Health Literature**

  
  How to Search CINAHL Plus with Full Text

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Go to CINAHL Plus at GHSON. (External use: User name: grahumnursing / Password: ghson)</td>
</tr>
<tr>
<td>2</td>
<td>At Sign In, Create Your Own Account.</td>
</tr>
<tr>
<td>3</td>
<td>Under Search Options, check English, add Publication Date limiters, check Human and under Age Groups, click All Adults, if appropriate. Then click Search. (S1: Search 1)</td>
</tr>
<tr>
<td>4</td>
<td>Click on CINAHL Headings (MESH) on the upper tool bar. Type a keyword into the box and click Browse.</td>
</tr>
<tr>
<td>5</td>
<td>Select applicable subject heading, then click Explode and Search Database (S2: Search 2)</td>
</tr>
<tr>
<td>6</td>
<td>Clear any search terms and click CINAHL Headings. Add a second keyword and click Browse.</td>
</tr>
<tr>
<td>7</td>
<td>Select applicable subject heading, then click Explode and Search Database (S3: Search 3)</td>
</tr>
<tr>
<td>8</td>
<td>Add additional keyword searches as necessary.</td>
</tr>
<tr>
<td>9</td>
<td>Select subjects (any except the limiter search) and Search with AND.</td>
</tr>
<tr>
<td>10</td>
<td>Scroll down to view results (if there are still too many, Search with AND, including the limiters. Additional limiters can be added if there are still too many, but choose carefully). A Full Text limiter can be used if the article is needed immediately. Also, subheadings can be used to limit searches.</td>
</tr>
<tr>
<td>11</td>
<td>Print, read, copy/paste or email the full text articles.</td>
</tr>
<tr>
<td>12</td>
<td>Any articles you would like to read that are not available in full text, click Save to Folder. Make a copy of the Saved articles before you sign out.</td>
</tr>
<tr>
<td>13</td>
<td>Print, Email, Save or Export the Folder articles to Lynette AND yourself.</td>
</tr>
<tr>
<td>14</td>
<td>When emailing, at Standard Field Format-Choose Brief or Brief and Abstract. At Citation Format-Choose APA. The APA format is sometimes inaccurate, so double check.</td>
</tr>
<tr>
<td>15</td>
<td>CLICK: Request this article.</td>
</tr>
<tr>
<td>16</td>
<td>Keep a copy of your Search History, otherwise when you sign out you will lose it.</td>
</tr>
<tr>
<td>17</td>
<td>By setting up a personal account, you can create your own set of preferences.</td>
</tr>
</tbody>
</table>
Why Start with CINAHL?
Why Start with CINAHL?

- Comprehensive
- Authoritative
- Reliable Subject Headings
- Subheadings-Tree Structure
- Combined Searches
- Full Text
- Nursing Focus
- Multiple Limiters
- Keyword List
- Related Articles
Searching CINAHL Plus
GHSON Library Resources Page:
http://www.grahamschoolofnursing.org/Library/resources.html
EBSCOhost

• Once you have opened CINAHL, you might want to create an EBSCOhost account. This is optional, but saving your personal Preferences for future searches is one of the benefits.
Modifying preferences

Click on Preferences to change the default settings to better meet your needs.
Preferences

**Format:** Brief provides enough information to complete a reference.

**Results per page:** 50

**Page layout:** Try them to see what meets your needs.

**Default format:** Brief citation

**Citation format:** Choose APA but don’t depend on it’s accuracy. Sometimes information is missing or formatted incorrectly, but it can be a starting place.

**E-mail:** enter your email address.
Use the limiters on this first page. They will save you time.

We recommend that you check or complete:
- English Language
- Human Age Groups
- Publication Dates (appropriate to your assignment).
Click Search at the bottom of the page. The four primary limiters will be added to your Search History for later use, if you need them.
Limiters

• In the Level I research training, we showed you how to set up four limiters to use on the first screen of a CINAHL search: English Language, Publication Dates, Human, and Age Groups.

• There are many other limiters to choose from. If your results are huge, after you have added the four limiter search, you might want to carefully add additional limiters, one at a time.

• A word of caution. **Narrowing your search by using many limiters will very quickly end in no results.**

• Tip: By checking Full Text, you will eliminate articles that we might have on the shelf in the library or articles we could request from another library.
CINAHL Headings

- This is a great tool to verify that your terminology is the same used by the database. Using the same terminology is essential in retrieving the results you want.
neoplasms
For example, “cancer” is not a medical subject heading, but if you use the CINAHL Headings, you’ll be lead to the correct term to search, “neoplasms.”
• Check to view subject headings.
• Select the Explode box when available.
• This creates a Tree Structure, branching out with additional information and options.

Scroll down to find that there are numerous pages of subject headings and suggestions for cancer, be sure to look through them to find the appropriate term to meet your needs.
Explode and Major Concepts

• Explode picks up all narrower terms.

• Major Concept requires your term to be a major point of the paper.
The MH before “Neoplasms+” represents Mesh Heading which is the terminology that the database uses. Ideally, if your subjects have MH in front of the term, and you have chosen the terms accurately, you should receive results that meet your needs.

Please note the result number is HUGE due to the use of a non-specific subject heading.
Sample Search: To begin a search, first run a search of the basic limiters as a group as shown previously.

- We’re going to look for articles about how breast cancer affects breast feeding using these search terms:
  - Breast cancer
  - Breast feeding
Use the CINAHL Headings to run a search on “breast cancer.” Use the Advanced Search function.
CINAHL will lead you to “breast neoplasms.” Check the subject and click Explode to get as many results as possible.
See the results below of the limiter search and the “breast neoplasms” search.
In CINAHL Headings, search for another subject, this time “breast feeding.” Explode and Search.
While it’s possible you could select all of the subject headings and subheadings that are relevant to your search at the same time, it is best to select and search them individually so you can see the results per specific subject term.
Now you have a list of 3 searches. Look at the number of results.
• CINAHL allows you to make your search more efficient by using two Boolean search strategies
• You have the option to “Search with AND” or “Search with OR”.

• When you Search with OR, your results will include all the results for breast neoplasms and all of the results for breast feeding. (Many)
• When you Search with AND, your results only include the articles that include information on BOTH breast neoplasms and breast feeding. (Fewer)
Breast Neoplasms OR Breast Feeding

Breast Neoplasms AND Breast Feeding
To find out how breast feeding is affected by breast neoplasms, combine the two searches with “AND”.
164 Results

<table>
<thead>
<tr>
<th>Search ID#</th>
<th>Search Terms</th>
<th>Search Options</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4</td>
<td>(((MH &quot;Breast Feeding&quot;) OR (S2 AND S3))</td>
<td>Search modes - Boolean/Phrase</td>
<td><img src="" alt="View Results (164)" /></td>
</tr>
<tr>
<td>S3</td>
<td>((MH &quot;Breast Feeding&quot;)</td>
<td>Search modes - Boolean/Phrase</td>
<td><img src="" alt="View Results (12,699)" /></td>
</tr>
<tr>
<td>S2</td>
<td>((MH &quot;Breast Feeding&quot;)</td>
<td>Search modes - Boolean/Phrase</td>
<td><img src="" alt="View Results (42,032)" /></td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td><img src="" alt="View Results (283,306)" /></td>
</tr>
</tbody>
</table>

Limiters - Published Date from: 20080101-20130131; English Language; Human; Age Groups: All Adult; Search modes - Boolean/Phrase
After each change or edit, Refresh.
Please Note in the Actions Column the Results from Combining the Searches.

Click on the View Results link to see the results for each search.
Is It Research & Relevant to the Assignment?

• Browse the results.

• They are listed from most recent to oldest. Is the publication date in the last five years? Are the References current?

• Watch for indications of research, such as Research used as a keyword, subject or tag.

• Are the results presented clearly with tables, graphs or other clear graphics?
Is It Research & Relevant to the Assignment?

• If you need the article NOW look for a Full Text icon or PDF.

• Check the number of pages of the article in the citation. If it is just a page or two, it probably is not real research. Most research articles are several pages long.

• If you see the word “review” in the text or citation, make sure it is a systematic review (an extensive review of the literature), not a brief review of an article.
Reviews

• Systematic Reviews are the highest level of evidence based practice. However, some instructors will not accept systematic reviews for some research assignments. No instructors will accept book or article reviews for research articles. Be careful if you read the word review in an article citation and recognize what you’re looking at and what is acceptable for your assignment.
Is This Article Acceptable for Your Assignment?

• The requirements and expectations for each course, each instructor and each assignment can vary. Read your assignment carefully. FOLLOW THE DIRECTIONS. When in doubt as to whether or not an article is acceptable for a specific assignment, take the article to the instructor who made the assignment for approval.
A systematic review of the association between breastfeeding and breast cancer.

(includes abstract) Yang L; Jacobsen KH; Journal of Women’s Health (15409996), 2008 Dec; 17 (10): 1635-45. (journal article - research, systematic review, tables/charts) ISSN: 1540-9996 PMID: 19049358

Abstract: Breastfeeding is hypothesized to reduce the risk of breast cancer primarily through two mechanisms, differentiation of breast tissue and reduction of the lifetime number of ovulatory cycles, but previous reviews of the association between breastfeeding and breast cancer have not consistently found that breastfeeding reduces the risk of breast cancer. Our systematic review yielded 30 case-control studies and 1 cohort study published between 1994 and 2007. Of the 27 studies that assessed the effect of ever breastfeeding compared with never breastfeeding, only 11 found significant protection against breast cancer. Of the 24 studies of the effect of breastfeeding duration, only 13 found a reduced risk of breast cancer with extended lactation. We conclude that no consensus about the relationship between breastfeeding and breast cancer is emerging. Expanded consideration of possible confounders for this relationship is required to determine if breastfeeding is protective and how protection might be conferred.

Subjects: Breast Feeding; Breast Neoplasms

Database: CINAHL Plus with Full Text:

Show all 7 images

Add to folder | Cited References: (59)
Evaluating an Article

• First, read through the title and abstract and then skip to the discussion. Is it what you’re looking for?

• Does it include the core components of a research article listed previously?

• Look at the problem/purpose and then skip to the conclusion.

• If the article does not meet your needs, do not take the time to read it. You can better spend your time searching for another more relevant article.
Evaluating an Article

• If it still looks good, read the entire article.

• Ask yourself: 1) is it usable? 2) is it complete? 3) is it consistent?

• There are scales available to determine the scientific merit of the research by evaluating the level of the quality of evidence. For example: www.nursingworld.org/DocumentVault/NursingPractice/Research-Toolkit/JHNEBP-Research-Evidence-Appraisal.pdf

• The references at the end of an article are a good source of additional resources on your topic.
When you find an article you want to read, you have three choices:

1. If it’s available in Full Text, you can open, read, save, email or print it.

2. If it is not available in Full Text, but we have a print subscription, you can go to the library and find it.
3. If it’s not available in the GHSON print collection, click on “Request this Article” and complete the required information. An interlibrary loan request will be initiated for you within 24 hours.

Also, print a copy for yourself to keep track of the articles you have requested and received. Each citation contains all the APA information you need to reference the article.
Warning

• The program will log out if it is idle too long. It is always best to email yourself results, or at least the search history, in case you would be interrupted unexpectedly. If the system times out, EVERYTHING you have completed IS LOST.
Print, Email, Save to Folder, Cite Tools
Print your search history so that you won’t have to repeat it later.

<table>
<thead>
<tr>
<th>#</th>
<th>Query</th>
<th>Limiters/Expanders</th>
<th>Last Run Via</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4</td>
<td><code>(((MH &quot;Breast Feeding+&quot;)) AND S3)</code></td>
<td>Search modes - Boolean/Phrase</td>
<td>Interface - EBSCOhost</td>
<td>164</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Search Screen - Advanced Search</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Database - CINAHL Plus with Full Text</td>
<td></td>
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<td>Search Screen - Advanced Search</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Database - CINAHL Plus with Full Text</td>
<td></td>
</tr>
</tbody>
</table>
Always save relevant citations to your Folder.
Saved Results Folder

• It’s sometimes easier to save everything you are interested in to your Folder first.

• Then you can look at all saved articles at once and evaluate and compare them to choose the ones that best meet your needs before printing or emailing them.
Select one, two or all.

Give the library a copy of what you would like to receive via ILL and keep a copy for yourself so you can keep track of which articles you have received. Each citation contains all the APA information you will need to reference the article.

Print, E-mail, Save to file or Export
Using the Citations from Your Folder

• We recommend saving or emailing all of the results to yourself even if you have more than you need. Then if some of the articles are unavailable or not useful, the search does not have to be run again. Just use some of the extra articles that were saved.

• Multiple actions can occur with each saved citation, they just have to occur in different steps. The actions include emailing, printing, saving or exporting the records.
Using the Citations from Your Folder

• Email all to yourself. Email the ones not available in full-text or in the library to Lynette to get through interlibrary loan.

• Email all using the APA formatting so there is an electronic version in APA format. We have found errors, so double check the citations before turning in your paper. Use the provided APA formatting only as a starting place to build your reference page.
Printing from Saved Results Folder

When printing or emailing to yourself, have the search history and the full text sent so you know what terms were searched to get the results.

Be careful. If this is marked the items will be deleted after printing, or emailing. We recommend to only delete once you have the results in hand or in your email.

When printing or emailing results to the library to be requested from another library, please only include the Brief Citation. That provides us with the information we need.
Emailing from saved results folder

- The same options apply when emailing citations from the saved results folder as when printing, and saving to an electronic file.
- When emailing requests to library staff, send it also to yourself so you can keep track of what you have received and what else you are expecting.
Printing in APA Format

- Using this option can be very helpful.
- It is always good to double check their APA formatting because we have found errors.

- It is easier to cut and paste from an electronic version or retype from print than creating your own reference list in APA format from scratch.
Example of Emailed Results in APA Format.

As the articles are used, the citations can be added to your reference page by copying and pasting from the email and then editing out the additional information.
RefWorks is an online research management, writing and collaboration tool. It is used to sort and organize bibliographic citations.

Through our OSF affiliation we have access to use RefWorks.

If you want to use RefWorks, contact Michelle and she will assist you in getting a RefWorks account.
Beyond CINAHL-Other Acceptable Sources for Research Articles

• **GHSON Print Journal Collection** — We have a number of journals that focus on research. Many of the other journals have a research section per issue*.

  Applied Nursing Research
  Clinical Nursing Research
  Journal of Advanced Nursing
  Journal of Nursing Scholarship
  Journal of Professional Nursing
  Nursing Outlook
  Nursing Research
  Nutrition in Clinical Practice*
  Oncology Nursing Forum
  Perspectives in Psychiatric Care*
  Psychiatric Services*
  Simulation in Healthcare.
Beyond CINAHL - Other Acceptable Sources for Research Articles

- AHRQ — Agency for Healthcare Research & Quality  
  http://www.ahrq.gov/

- National Clearinghouse Guidelines  
  http://www.guideline.gov/


- Google Scholar – www.scholar.google.com
Beyond CINAHL-Other Acceptable Sources for Research Articles
Beyond CINAHL-Other Acceptable Sources for Research Articles
Recommendations

• Start and complete your research 3 weeks before the paper is due.
  – It takes time, especially for physical items, to be received via interlibrary loan. Requesting early assists us in being able to secure the items you want.
• Create your Reference page.
  – Once you have identified a reference to use in paper, put the citation in APA format.
• Organize your information in folders or a 3 ring binder by subject/section of your paper.
  – You will know exactly where to go to gather more information for a specific subject.
• Don’t forget that your textbooks are excellent sources of information.
Additional Resources


Remember

• Contact a library staff member if you have any questions. If you would like to set up an appointment for one on one instruction please call ext. 2343 or email library@grahamhospital.org

• Happy Searching