Theory connections

Use of the Hage framework for theory construction: Factors affecting glucose control in the college-aged student with type 1 diabetes

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ABSTRACT

This article describes the Hage framework for theory construction and its application to the clinical problem of glycemic control in college-aged students with type 1 diabetes. College-aged students with type 1 diabetes struggle to self-manage their condition. Glycated hemoglobin (HbA1c), if controlled within acceptable limits (6–8%), is associated with the prevention or delay of serious diabetic complications such as kidney and cardiovascular disease. Diabetes educators provide knowledge and skills, but young adults must self-manage their condition on a daily basis, independent of parents. The Hage framework includes five tasks of theory construction: narrowing and naming the concepts, specifying the definitions, creating the theoretical statements, specifying the linkages, and ordering components in preparation for model building. During the process, concepts within the theory were revised as the literature was reviewed, and measures and hypotheses, foundational to research, were generated. We were successful in applying the framework and creating a model of factors affecting glycemic control, emphasizing that physical activity, thought of as a normal part of wellness, can be a two-edged sword producing positive effect but also serious negative effects in some college-aged students with type 1 diabetes. Contextual factors important to self-management in college-aged students are emphasized. The Hage framework, already used to a small extent in nursing curricula, deserves more attention and, because of its generic nature, may be used as a template for theory construction to examine a wide variety of nursing topics.

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1. Introduction

This paper uses the clinical problem of glycemic control in college-aged students with type 1 diabetes as an exemplar of connecting theory to research in a challenging problem for nursing practice. Specifically, the authors summarize the Hage framework for theory construction that was originally developed for use in sociology and describes its application in nursing research as an aid to thinking about thinking, that is, clarifying ideas, and organizing thoughts about specific clinical situations or problems that would benefit from theory construction (Hage, 1972). Facilitating college-aged students' management of their type 1 diabetes poses special healthcare challenges and is one such clinical problem.

1.1. Type 1 diabetes in the college-aged student

Type 1 diabetes is an autoimmune disorder primarily affecting the young. Currently, glycemic control in those with type 1 diabetes is less than optimal. In fact, statistics related to its management are alarming (American Diabetes Association [ADA], 2017). Fewer than 1 in 20 achieve target glycated hemoglobin (HbA1c) levels, and up to 37% already have serious complications of diabetes at a young age (Balfe, 2009). Glycemic control in the young adult years, for example in college-aged students, is critical to prevent or limit the severity of diabetes complications and reduce premature mortality (Weissberg-Benchell, Wolpert, & Anderson, 2007). Diabetes complications in the young include retinopathy and cataracts leading to diminished vision, nephropathy and microalbuminuria, neuropathy especially of the feet, early atherosclerosis, and death related to alcohol overdose or severe hypoglycemia (Miller-Hagan & Janas, 2002). Yet, college-aged students may find it difficult to manage their diabetes well during their transition to and during college (Balfe, 2009). Lifestyle modification is not automatic or easy, and type 1 diabetes in the college-age student requires intensive daily self-management away from home (ADA, 2017; Balfe, 2009; Miller-Hagan & Janas, 2002). For those young adults who did not manage their disease well before college, beginning a healthy lifestyle to manage their diabetes at college is likely to be especially challenging. Given the seriousness of type 1 diabetes and its sequelae and the challenges college-aged students face, it is surprising that more theoretical work has not been completed.
The term college-aged student is defined here as a student who is 18–19 years of age, diagnosed with type 1 diabetes, enrolled in college classes, and in residence on a college campus. It is assumed that: (a) it is the student who needs to manage the disease to maintain glycemic control, (b) the student needs to become more independent in managing the disease, (c) self-management requires an active transition from home to the college environment, and (d) glycemic control is beneficial even though it seems like hard work.

The difficulty in managing type 1 diabetes is increased because the college-aged student must adapt to a new environment with more accountability and responsibility upon themselves with essentially decreased accountability to their parents for all aspects of daily living. This, in and of itself, can be a major stressor amidst stressors related to college life. Examples of stressors secondary to college life are possibly heavier coursework, diminished parental guidance, and the stress of finding new friends on top of diabetes self-management. In addition, college life is unstructured with irregular routines, and diabetes management may be inconvenient as it may interfere with college life and activities. Removed from parental watch, college-aged students may engage in risky health practices such as sexual activity, sedentary lifestyle, poor eating habits, and alcohol consumption. College-aged students with diabetes may feel peer pressure to consume alcoholic beverages to “fit in” with other students, putting themselves at risk for severe hypoglycemic events and poor glycemic control. Although unhealthy behaviors seem only somewhat risky on the face of it, in the college-aged student with type 1 diabetes, these behaviors can lead to premature progression of the disease with far reaching consequences in regards to health (Balfe, 2007; Balfe, 2009; Eaton, Williams, & Bodansky, 2001; Miller-Hagan & Janas, 2002; Ramchandani et al., 2000; Wilson, 2010).

1.2. Tasks of theory construction in the Hage framework

The Hage framework of theory construction is a method used to broaden thinking and extend the imagination, using strategies and techniques to refine existing concepts and discover new concepts. The Hage framework provides structured pathways or tasks beginning with an idea. It involves experimenting with thoughts about the particular idea to derive theory (Hage, 1972). The five tasks of theory construction are narrowing and naming the concepts, specifying the definitions, creating the theoretical statements, specifying the linkages, and ordering components in preparation for model building. The Hage framework is used to some extent in graduate-level nursing courses and is referenced in books and published articles about theory construction (Bekhet & Zauszniewski, 2008; Purnell, 2002).

1.2.1. Task 1: narrowing and naming the concepts

Hage (1972) asks, “Where does one start theory construction?” The process starts with (a) one very broad concept that needs to be narrowed, (b) a complex concept broken into manageable parts, or (c) the formation of hypotheses from the literature, for which theoretical underpinnings are generated. The first task of theory construction is to narrow and name each concept, starting with the most important one.

The next goal is to give a concept a specific name, to help with description and classification. Hage suggests that terms such as extent, degree, number, severity, and frequency should be in the concept name, making thinking about concepts easier. Any new concepts that emerge during the process of theory construction must undergo the same narrowing and naming process (Hage, 1972).

1.2.1.1. Exemplar. Completing this task resulted in a list of seven named and narrowed concepts pertinent to glycemic control in college-aged students with type 1 diabetes. Initially, the concepts considered were food intake, insulin administration, physical activity, minimal blood glucose testing, health care provider (HCP) visits, alcohol use, and glycemic control as measured by the HbA1c blood test. These concepts arose from clinical practice and the literature. Then, the concepts were revised after a further review of the literature and after clarification of the treatment regimen prescribed by the HCP and aspects of wellness routinely taught by the nurse. Carbohydrate intake (not food intake), insulin administration, and blood glucose testing are prescribed by the HCP. Physical activity is recommended to be performed as tolerated. The number of HCP visits per year is prescribed (every three months) by the HCP. Alcohol use may not be discussed by the HCP, but is taught as part of wellness by the nurse. HbA1c indicating glycemic control and reflecting the long-term glucose level is measured at HCP visits, every three months.

Concepts were revised and renamed as the following phrases: Degree of carbohydrate intake as prescribed, degree of insulin administration as prescribed, degree of physical activity, extent of blood glucose testing as prescribed, number of prescribed HCP visits attended, extent of alcohol use, and extent to which HbA1c is within acceptable limits (6–8%).

1.2.2. Task 2: specifying the definitions

Once concepts have been narrowed and named, they are defined. Hage (1972) suggests that the two types of definitions, theoretical and operational, provide different ways of comprehending a concept. Precise definitions of both types enhance the clarity of concepts being examined and make it possible to see the connections between these definitions.

The theoretical definition of a concept is a specification of its essential properties, or the characteristics that uniquely identify it. The theoretical definition conveys the meaning that the researcher, for example, attaches to the concept and provides a “meaning space” for indicators of the concept (Hage, 1972). He noted that theoretical definitions are created by (a) searching the literature and finding implied and buried definitions that can be applied, (b) using indicators to suggest a theoretical definition, and (c) using more broad theoretical definitions to create more specific ones.

In contrast, operational definitions focus on a set of indicators used to measure a concept and provide explicit criteria for concept measurement (Hage, 1972). Methods used to develop operational definitions are similar to those used to develop theoretical definitions and include (a) searching the literature, (b) using a theoretical definition to suggest an operational definition, and (c) using more broad operational definitions to create more specific ones.

Using both definitions, it is easier to eliminate concepts with the same or similar definitions. In addition, Hage (1972) suggests that including a theoretical definition leads to more valid measurement indicators of a concept. Without a theoretical definition, indicators may be too specific. Including an operational definition means that the utility and fit of the theoretical definition can be judged. Without an operational definition, the meaning of a concept may be too vague.

1.2.2.1. Exemplar. Completing this task resulted in a table of seven theoretical and operational definitions with its respective concept. Table 1 presents the idea of matching concepts, theoretical definitions, and operational definitions. The definitions were derived from clinical experience and the literature. The definitions match each other and the concept, and they illustrate the meaning and measure of each concept important to glycemic control in the college-aged student with type 1 diabetes.

1.2.3. Task 3: creating theoretical statements

Theoretical statements, also known as propositions, connect two or more concepts. Combining concepts into theoretical statements is necessary to explain or predict a phenomenon; concepts alone cannot do this because they cannot be tested. In theoretical statements, concepts are connected in a continuous or categorical fashion. Continuous theoretical statements may emerge if the following questions are asked: “What are the causes of the concept? What are the consequences of a concept?” (Hage, 1972, p. 55) “Are two concepts correlated?” (Hage,
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