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SHORT REPORT

Maintenance Self-Efficacy Beliefs Predict Dietary Fat Reduction Habits in Individuals with Coronary Artery Disease and/or with Diabetes

Sylvie Robichaud-Ekstrand, RN, PhD

Abstract

Background: *New evidence for the phase-specific separation of self-efficacy (SE) indicates that SE functions differently at various points in time within the self-regulatory behavioural change process. Maintenance SE involves optimistic beliefs about one's capability to sustain a behaviour regardless of impediments.*

Purpose: *This short report consists of secondary analyses from a longitudinal cohort study. It intends to examine the predictive value of maintenance self-efficacy beliefs on particular dietary fat reduction habits in patients with CAD and/or with diabetes.*

Method: *The self-efficacy scale for eating low-fat foods and the Dietary Habits Questionnaire were administered at baseline and six months later. Maintenance SE beliefs were the predictors at baseline, and dietary fat reduction habits were the dependent variables at six months. Cases with full data on these variables were used in regression analyses, and were performed on 410 (79.30%) subjects.*

Results: *SE beliefs during difficult situations predicted substituting high-fat foods to low fat foods, modifying meat to decrease fat content, avoiding frying, and replacing high-fat foods with fruits or vegetables. SE beliefs during positive social events predicted the same, with the exception of avoiding frying. SE beliefs during affective negative circumstances did not contribute to any of the healthy dietary fat reduction habits. There were no SE predictors for avoiding fat as a spread or for flavouring.*

Conclusion: *Maintenance self-efficacy beliefs predict particular dietary fat reduction habits that may lead to healthy body weight. These findings provide additional empirical support for the sub-division of self-efficacy in the context of dietary behavioural change.*

Key words: food habits, eating behaviour, self-efficacy, coronary artery disease, diabetes

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Clinical Highlights

- Being more optimistic about one's capability of eating low-fat foods in situations where high-fat foods are readily available or when preparing low-fat meals is too much trouble, or even when feeling happy and positive at social events, reinforces the likelihood of utilizing proper dietary fat reduction habits. These habits include substituting high-fat foods to low fat foods, modifying meat to decrease fat content, avoiding frying, and replacing high-fat foods with fruits or vegetables.
- When overwhelmed by situations or circumstances that produce bad feelings or emotional vulnerability, confidence levels in being capable of eating low-fat foods do not support dietary fat reduction habits. Being accepting of one's feelings or diffusing difficult thoughts are other cognitive strategies that could potentially reinforce dietary fat reduction habits.

Evidence from cross-cultural studies, prospective cohort studies, and dietary and lifestyle intervention studies has indicated that healthy eating, body weight, and lifestyle lower the risk of cardiovascular morbidity and mortality (Petersen et al., 2015). Adherence to the Mediterranean diet (fruits, vegetables, legumes, cereals, fish and moderate consumption of red wine) was associated with a 10% reduction in cardiovascular incidence and mortality (Sofi, Abbate, Gensini, & Casini, 2010). Since diet, lifestyle, and lipoprotein metabolism interact in the development of atherosclerosis and its complications, recommendations for the general population, and clinical guidelines for high-risk individuals and those with manifest cardiovascular diseases, have been formulated. Reducing fat intake, particularly saturated and trans fats, and obtaining or maintaining a healthy weight (body mass index below 25 kg/m^2) are two of these important recommendations (Verschuren, 2012). As fats constitute an important source of energy, a high total fat intake

is associated with excessive energy intake, which results in excess body weight and obesity, creating complications such as insulin resistance, diabetes, and cardiovascular diseases (Verschuren, 2012). Clinical trials have revealed that a low-fat diet promotes weight loss (Astrup, 2005). This is because low-energy-density diets tend to favour satiety, which results in long-term weight reduction (Ledikwe et al., 2006). Hence, individuals with coronary artery disease (CAD) and/or diabetes have routinely been advised to modify their eating habits and to alter their meal preparation practices accordingly (Delahanty et al., 2013; Miller, Weinhold, & Nagaraja, 2016). Health self-regulation in the context of dietary behaviour change is mandatory, but is daunting for many individuals with CAD and/or diabetes. Comparing individuals with healthy coronary arteries, patients with confirmed coronary atherosclerosis have reported using cooking methods such as deep frying, stir frying, and pan frying, over steaming or boiling (Loke & Chan, 2005). Established eating habits are hard to break, and creating new ones require resilience that necessitates complex cognitive and behavioural mechanisms intertwined within the behaviour change process.

Self-efficacy (SE), the confidence in one's capacity to perform specific behaviours (Miller et al., 2016), has repeatedly predicted health behaviours in patients with CAD (Chiou et al., 2009). It also was found to be the most powerful determinant of intention to perform and maintain dietary behaviour in patients with diabetes (Didarloo, Shojaeizadeh, Gharaaghaji Asl, Niknami, & Khorami, 2014). For each unit improvement in SE for eating low-fat foods, participants in the Diabetes Prevention Program were found to be three times more likely to achieve a 7 % weight loss (Delahanty et al., 2013). Self-efficacy is decidedly a powerful and vital factor in initiating and maintaining healthy dietary behaviours (Richert et al., 2010). But then, self-efficacy was found to be functionally different at various points in time within the self-regulatory behavioural change process. Evidence for the phase-specific separation of self-efficacy was confirmed in the context of dietary change in individuals who were overweight or obese (Ochsner, Scholz, & Hornung, 2013). Phase-specific SE was also found to differ in its effects in various preventive health behaviours (Martinez-Brockman, Shebl, Harari, & Pérez-Escamilla, 2017; Scholz, Nagy, Göhner, Luszczynska, & Kliegel, 2009; Schwarzer et al., 2007).

To improve health self-regulation and to design stage-matched interventions for relatively homogeneous target groups, the health action process approach (HAPA) combined predictor variables and stages of change that interplay within the behaviour change process (Richert et al., 2010; Schwarzer, Lippke, & Luszczynska, 2011). This model subdivides the health behaviour process into two phases, the motivational and volitional phases. In the motivational phase, risk perception, outcome expectancies, and task self-efficacy become predisposing factors for goal-setting. Once the intention is established, the individual is in a pivotal position to pursue a goal that will alter the behaviour. This volitional phase requires planning, action control, maintenance and recovery self-efficacy. Maintenance SE[1] involves optimistic beliefs about one's capability to sustain a behaviour regardless of impediments. Individuals in this mindset anticipate and plan for potential barriers. They use more effective strategies, produce more effort, and persevere longer to maintain the acquired healthy behaviours. Recovery SE refers to an individual's conviction to regain control after a setback or failure. Maintenance and recovery SE were found to be significantly negatively related to weight loss after a three-month non-contact in the maintenance period in the experimental group participating in a 16-week group-based intervention adapted from the Diabetes Prevention Program (Miller et al., 2016). While recovery SE is beneficial when restarting an interrupted chain of action, maintenance SE is thought to be most useful when facing impediments when acting (Miller et al., 2016). Differentiating self-efficacy beliefs in the volitional phase needs more empirical evidence (Ochsner et al., 2013).

This short report consists of secondary analyses from a prospective cohort study conducted by the author. A pre-test post-test longitudinal design was used to determine the predictive value of maintenance SE on five particular dietary fat reduction habits in patients with CAD and/or with diabetes who are confronted with difficult situations, tempting positive social events, and affective negative circumstances.

Methods

Sample

Subjects were recruited from outpatient clinics in two tertiary hospitals in Canada. Inclusion criteria included: established diagnosis of CAD and/or type 2 diabetes (as indicated in the medical records), and not having had a major health event in the past six months (myocardial infarction, coronary artery bypass graft surgery). Moreover, participating cardiologists and endocrinologists had to agree to follow their patients every six months for the next year.

The sample consisted of 517 participants at baseline. It comprised individuals with CAD (n = 257, 49.7%), diabetes (n = 148, 28.6%), and CAD with diabetes (n = 112, 21.7%). Their mean age was 62.7 years (SD = 9.4), ranging from 32 to 80 years. Additional participant characteristics at baseline are presented in Table 1.

Of the 517 subjects who initially consented to participate in the study, 107 (26.70%) missed their six-month interview because five were deceased, 14 did not meet follow-up criteria, 15 discontinued their participation voluntarily, 19 were lost to follow-up, 48 experienced scheduling issues, and six were not accounted for because the study ended prematurely. Secondary analyses were, therefore, performed on 410 (79.30%) subjects.

1. *The term maintenance SE has been used interchangeably with coping or situational SE.*

Table 1: Characteristics of Participants at Baseline					
Characteristic	**CAD (*n* = 257)**	**Diabetes (*n* = 148)**	**CAD + Diabetes (*n* = 112)**	**Total (*N* = 517)**	**%**
Gender					
Women	58	72	41	171	(33.21)
Men	199	76	71	346	(66.92)
Civil Status					
Married/ common-law	201	96	82	379	(73.31)
Single or living Alone	56	52	35	138	(26.69)
Education in years					
0 – 6 (Primary School)	87	32	32	151	(29.21)
7 – 12 (High School)	68	45	42	155	(29.98)
13 – 15 (College/Technical School)	34	27	14	75	(14.51)
≥ 16 (University)	68	44	24	136	(26.30)
Type of employment					
Professional / Administrators	101	59	39	199	(38.49)
Clerk / secretary	25	18	14	57	(11.02)
Manual laborer	88	31	44	163	(31.53)
Housewife	8	7	4	19	(3.68)
Other type of work	35	33	11	79	(15.28)
Work Status					
Full- or part-time	79	53	33	165	(31.91)
Retired	171	85	74	330	(63.83)
Unemployed or on Welfare	7	10	5	22	(4.26)
Family income					
Below $15,000	73	56	35	164	(31.72)
$15,000-$29,999	108	46	56	210	(40.62)
$30,000-$59,999	48	30	19	97	(18.76)
Equal or above $60,000	28	16	2	46	(8.90)
Stature – Body Mass Index (BMI) (kg/m^2)					
Underweight (BMI < 18.5)	4	0	0	4	(.77)
Normal weight (18.5 ≤ BMI < 25)	70	32	18	120	(23.21)
Overweight (25 ≤ BMI < 30)	124	52	45	221	(42.75)
Class 1 – Obesity (30 ≤ BMI < 35)	41	34	27	102	(19.73)
Class 2 – Obesity (35 ≤ BMI < 40)	13	16	13	42	(8.12)
Class 3 – Obesity (BMI ≥ 40)	5	14	9	28	(5.42)

Procedure

Scientific and ethical committees of the Montreal Heart Institute and the CHUM (Centre hospitalier de l'Université de Montréal) assessed the research protocol and approved the consent form. All participants were treated according to the ethical guidelines of the Helsinki Declaration (Williams, 2008). Consenting individuals met a research assistant in an outpatient clinic. They completed at baseline and six months later, the back-translated French versions of the original SE Scale for eating low-fat foods (Ôunpuu, Woolcott, & Rossi, 1999) and the Fat-related Dietary Habits Questionnaire (DHQ) (Kristal, Shattuck, & Patterson, 1999). Just about all participants preferred having the research assistant read out loud the questions. These questionnaires took approximately 15 minutes to complete.

Instruments

Self-efficacy for eating low-fat foods. Individuals evaluated their confidence level to eating low-fat foods when faced with challenging or tempting situations over the past month. Difficult situations consisted of inconveniences that make eating low-fat foods difficult. Positive social events were situations that elicited positive and happy feelings. Affective negative circumstances referred to various situations that produced bad feelings or emotional vulnerability. A five-point Likert scale was used to measure SE (0=not at all confident, to 4=completely confident). Composite scores for SE were calculated by summing responses to the sets of related items, and then dividing it by the number of respective items within each respective SE category. Scores between 0 and 1.5 indicated low self-efficacy, while scores between 1.5 and 3 reflected average SE, and between 3 and 4, represented high SE. SE composite scores acted as independent variables. In this study, alpha coefficients for difficult situations, positive social events, and affective negative circumstances, were .81, .86, and .94, respectively. These coincide to those found in Ôunpuu et al.'s (1999) study (.83, 0.89, and .95, respectively), which also indicated high internal consistency reliabilities.

Dietary fat reduction habits. This study used the original version, translated into French, of the Dietary Habits Questionnaire (DHQ) from the Women's Health Trial Feasibility Study in Minority Populations (Kristal et al., 1999). It includes 23 items, classified into five dietary fat reduction habits. Using a four-point scale (1=rarely or never to 4= usually), participants evaluated over the past month, the frequency of abiding with the five dietary fat reduction habits: 1) substituting high-to low-fat foods, 2) modifying meat to decrease fat content, 3) avoiding frying foods, 4) replacing high-fat foods with fruits or vegetables, and 5) avoiding fat as a spread or for flavouring. Composite scores for each habit were calculated by summing responses to the sets of related items for each habit, and then divided by the number of items. Composite and summary scores acted as dependent variables.

A unit change in the DHQ score corresponds to a change between 8 to 12 percentage points in percentage energy from fat. A DHQ summary score greater than 2.5 indicated good dietary fat reduction habits. This was previously found to be associated with a daily fat content diet below 30% (Kristal, Shattuck, & Henry, 1990). DHQ scales were found to be dependable, with internal consistency reliability ranging from 0.46 to 0.73 at baseline, and from 0.49 to 0.77 at six months (Kristal et al., 1999). The present study reproduced similar internal consistency results for the DHQ scales, ranging from 0.35 to 0.73.

Statistical Analysis

Descriptive analyses were used to present participants' characteristics at baseline, and to compare maintenance SE and dietary fat reduction habits composite scores at baseline and at six months. Standard linear regressions were performed to assess the impact of SE beliefs when facing three specific impediments on the likelihood that patients with CAD and/or diabetes would report particular dietary fat reduction habits. Maintenance SE beliefs were the predictors or independent variables at baseline, and dietary fat reduction habits at six months were dependent variables. Cases were excluded from descriptive and regression analyses when they did not have full data on the variables examined. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

Results

All self-efficacy composite scores at baseline and at six months were between 1.5 and 3. All dietary fat reduction habits' composite scores were greater than 2.5 (Table 2). The prediction model using SE beliefs as predictors at baseline, and the summary score of dietary fat reduction habits as dependent variables at six months was statistically significant ($R^2adjusted = 0.179$, $F(3, 402) = 30.19$, $p < .001$. It explained 17.9 % of the shared variance. SE beliefs during difficult situations ($\beta = .139$, $t = 5.03$, $p < .001$), and during positive social events ($\beta = .08$, $t = 3.44$, $p < .001$) were significant predictors of overall dietary fat reduction habits at six months, but SE beliefs during affective negative circumstances were not ($\beta = -.009$, $t = -.45$, $p = .66$).

Further analyses using particular dietary fat reduction habits as dependent variables at six months produced congruent results ($p < .05$) (Table 3). SE beliefs during difficult situations predicted substituting high-fat to low-fat foods, modifying meat to decrease fat content, avoiding frying foods, and replacing fat foods with fruits and vegetables. SE beliefs during positive social events predicted the same dietary fat reduction habits, with the exception of avoiding frying. SE beliefs during affective negative circumstances did not yield any unique contribution to any of the dietary fat reduction habits. None of the SE beliefs predicted avoiding fat as a spread or for flavouring.

Table 2: Self-efficacy Beliefs and Dietary Fat Reduction Habits Mean Scores at Baseline and at 6 Months						
Variable	**Baseline**			**6-month**		
	n	**Mean**	***SD***	***n***	**Mean**	***SD***
Self-efficacy						
SE - Summary score	513	2.52	(.92)	409	2.79	(.46)
SE - Difficult situations	513	2.62	(1.02)	408	2.66	(.91)
SE - Positive social events	513	2.24	(1.13)	408	2.42	(1.04)
SE - Affective negative circumstances	507	2.68	(1.20)	405	2.57	(1.11)
Dietary fat reduction habits						
Summary score	514	2.76	(.44)	410	2.79	(.46)
Substituting high-fat to low-fat	514	2.43	(.86)	409	2.52	(.83)
Modifying meat fat content	510	3.29	(.86)	408	3.26	(.87)
Avoiding frying foods	513	3.36	(.62)	410	3.35	(.62)
Replacing fat foods with fruits and vegetables	503	2.78	(.72)	404	2.37	(.74)
Avoiding fat as a spread or for flavouring	513	2.45	(.73)	409	2.42	(.71)
Note. Cases were excluded from analyses if they did not have full data on these variables.						

Table 3: Self-efficacy Beliefs when Faced with Impediments, Predicting Particular Dietary Fat Reduction Habits at 6 Months					
SE when faced with impediments (independent variables at baseline - predictors)	**Particular dietary fat reduction habit (dependent variable at 6 months)**				
	Substituting high-fat to low-fat foods	**Modifying meat to decrease fat content**	**Avoiding frying foods**	**Replacing fat foods with fruits and vegetables**	**Avoiding fat as a spread or flavouring**
Overall Model	R^2*adjusted* = .054 *F* (3,401) = 8.63, *p* < .001*	R^2*adjusted* = .078 *F* (3,400) = 12.26, *p* < .001*	R^2*adjusted* = .051 *F* (3,402) = 8.24, *p* < .001*	R^2*adjusted* = .094 *F* (3,396) = 14.72, *p* < .001*	R^2*adjusted* = .043 *F* (3,401) = 6.95, *p* < .001*
Difficult situations	β = .12, *t* = 2.21, *p* = .028*	β = .19, *t* = 3.33, *p* = .001*	β = .12, *t* = 3.01, *p* = .003*	β = .19, *t* = 3.94, *p* < .001*	β = .078, *t* = 1.69, *p* = .09
Positive social events	β = .09, *t* = 2.16, *p* = .031*	β = .11, *t* = 2.54, *p* = .01*	β = .03, *t* = .91, *p* = .37	β = .10, *t* = 2.58, *p* = .01*	β = .04, *t* = 1.08, *p* = .28
Affective negative feelings	β = .007, *t* = .18, *p* = .86	β = -.05, *t* = -1.17, *p* = .24	β = .007, *t* = 21, *p* = .83	β = -.06, *t* = -1.65, *p* = .10	β = .054, *t* = 1.53, *p* = .13
Note. Cases were excluded from regression analyses if they did not have full data on these variables. SE = Self-efficacy. *p < .05.					

Discussion

Having been diagnosed with CAD and/or diabetes, participants in this study were already at high risk of further cardiovascular complications. Because three-quarters of the participants were classified into the overweight and obesity categories, regaining a healthy body weight was a priority. Both quantity and quality of the diet are important, but because fats constitute an important source of energy, total fat intake matters (Verschuren, 2012). At baseline, participants in this study reported having been fairly confident in maintaining their already good dietary fat reduction habits over the past month, and this, despite the various impediments. Even if small increments in maintenance SE and eating habits did occur six months later, participants never felt highly confident in maintaining any of the dietary fat reduction habits. This may indicate that dietary fat reduction behaviours have not yet become habitual, and that participants in this study were still at risk of reverting to old unhealthy eating habits.

Findings in this study indicated that higher maintenance SE for eating low-fat foods predicted particular dietary fat-reduction habits six months later. When high-fat foods were readily available, or preparing low-fat meals was too much trouble, self-efficacy during these difficult situations predicted substituting high-fat to low-fat foods, decreasing fat contents in meats, avoiding frying foods, and replacing high-fat foods with fruits and vegetables. Participants in this mind set reported more frequently the likelihood of eating salads with low-fat dressing, using low-fat cheese, and using fewer fats in recipes. They were more apt to decrease fat contents in meats by removing skin from chicken, and removing visible fat from meat. They were more predisposed to avoid frying foods when cooking chicken, fish, or vegetables. They also felt confident in replacing high-fat foods with fruits and vegetables by eating vegetarian meals, eating fruits for dessert, and having vegetables or fruits for snacks more frequently. Our findings support previous findings for low-fat food substitution behaviour in white Americans, and for meat modification behaviour in African Americans (Chang, Brown, Baumann, & Nitzke, 2008).

Positive social events most often occur when eating out at a restaurant, or celebrating with friends and being happy, or having a good time at a party. During these events, maintenance self-efficacy predicted three of the five eating habits. Higher self-efficacious individuals were more likely to substitute high-fat to low-fat foods, modify meat to decease fat content, and replace fat foods with fruits and vegetables. These findings are partially consistent with a previous study, but with some particularities that seem to be culture sensitive or related to socio-economic backgrounds. Substituting high-fat to low-fat foods, and replacing fat foods with fruits and vegetables were predicted similarly in white American mothers, whereas avoiding eating fried foods and avoiding spreading fat on foods (which were not the case in this study), were for African-American mothers (Chang et al., 2008). Purchasing low-fat foods, vegetables and fruits is more expensive than buying fatty foods. Acquiring such foods may prove to be financially out of reach for many individuals with low-incomes. This was not the case for most participants in this study, hence potentially explaining the differences in findings.

When being in a positive mindset, maintenance SE did not predict avoiding frying foods nor spreading butter or margarine on foods. Frying and using fat on foods are common meal preparation practices in restaurants and banquets, and usually out of an individual's control. Requesting food to be boiled or steamed at social events may cause awkwardness or even be regarded as impolite. Because action planning has previously been found to emerge as a significant predictor to low-fat intake at six months (Ochsner et al., 2013), using this technique during positive social events may turn out to be effective.

Self-efficacy when faced with overwhelming affective negative circumstances did not contribute to any dietary fat reduction habits. This happened when being frustrated, having arguments, not feeling good about oneself, or feeling depressed. These findings are puzzling and contradictory to those of others who reported that higher self-efficacious individuals experiencing these conditions are more likely to report dietary fat reduction habits (Chang et al., 2008). For example, higher self-efficacies of negative situations in African Americans and white mothers reported more frequently the likelihood of substituting high-fat foods for low-fat foods, whereas only confident white mothers reported being more capable to modify meat choices, avoid eating fried-food, and replace fat-foods with fruits and vegetables (Chang et al., 2008). Other cognitive factors and strategies may account for these inconsistencies. Restructuring one's belief system and accepting difficult feelings while persisting in value-based action can diffuse difficult thoughts and increase psychological flexibility (Forman, Butryn, Hoffman, & Herbert, 2009; Katterman, Goldstein, Butryn, Forman, & Lowe, 2014; Lillis et al., 2016). Because dietary fat reduction habits are complex and repetitive, internalizing and memorizing action plans during these various challenging situations may improve maintenance SE and lead to healthier eating habits (Wiedemann, Lippke, Reuter, Ziegelmann, & Schüz, 2011; Wiedemann, Lippke, & Schwarzer, 2012).

Study limitations. The present report has several limitations. Secondary analyses were performed from a longitudinal cohort study. Hence, the sample was not powered to detect significant changes for these variables. We were aware of the systematic drop-out of participants and missing data in questionnaires. We chose to treat missing data by keeping cases only if they had full data on the variables introduced into the regression analyses. This left a relatively high percentage and number of intact cases for analyses at six months. Several studies in health promotion geared to general populations used path-analytic methods. Because we

were interested in developing self-regulation interventions matched to cognitive and behavioural factors in future studies, we decided to combine SE and dietary fat reduction habits into prediction equations. Self-efficacy scores and dietary fat reduction habits had improved in half of the participants between baseline and six months. External factors such as media messages, and additional informal counselling may account for improvements in self-efficacy scores between baseline and six months. Hence, baseline scores to predict results at six months could be regarded as a potential limit (Nothwehr, 2006).

Self-reports relying on recalling the food and meal preparation habits accurately over the past month may affect the validity of the assessment. However, it can also be considered an advantage, as it does not alter nutrition behaviour prospectively (Ochsner et al., 2013). The consistency reliability for the habit "replacing fat foods with fruits and vegetables" was low in this study, as well as in others (Kristal et al., 1999). Revisiting this sub-scale by incorporating more relevant items is recommended. Self-efficacy during difficult situations and during positive social events that significantly predicted this particular habit in this report should be interpreted with caution.

Implications and recommendations. Despite these limitations, the findings in this report are worthy of further investigations. Maintenance SE beliefs could be incorporated into the design of tailored weight reduction interventions. Further research is needed to determine the differentiating role of self-efficacy beliefs in the volitional phase on particular dietary fat reduction habits. More empirical studies are required to delineate these effects in relation to cultural and socio-economic backgrounds.

Conclusion

Findings from these secondary analyses provide additional empirical support for the sub-division of self-efficacy in the context of dietary behavioural change. Maintenance self-efficacy beliefs predict dietary fat reduction habits that may lead to healthy body weight. Tailoring future interventions to self-efficacy beliefs that impact positively on dietary fat reduction habits, can influence health outcomes and quality of life of individuals living with CAD and diabetes.

About the Author

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Canadian Cardiovascular Nurses' Knowledge, Practice and Advocacy Role in Promoting Evidence-Based Pre-Procedural Fasting Guidelines

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Abstract

Background: *Since 1990, the Canadian Anesthetists' Society (CAS) has promoted an evidence-based pre-procedural fasting guideline, which recommends that patients receive hydration two hours prior to surgery. Yet, the uptake of this guideline has been slow and inconsistent, resulting in detrimental effects. While there is a growing body of evidence about improved patient outcomes with a shortened pre-procedural fasting time, an evidence-practice gap remains in how this research is implemented by nurses.*

Purpose: *To examine Canadian cardiovascular (CV) nurses' current knowledge, practice and advocacy role pertaining to this guideline.*

Method: *Fifty-one CV nurses completed an online survey and descriptive statistical and content analyses were conducted.*

Findings: *All respondents reported they were knowledgeable about pre-procedural fasting in general, yet only 42% were aware of the CAS guideline, and 34% still believed all cardiac patients should be kept NPO after midnight prior to their procedure, which could be any noninvasive or invasive cardiac investigation, intervention or surgery. Of the 42% who were aware of the CAS guideline, 62% reported it was always or often implemented. Barriers to implementation of the CAS guideline included inconsistent medical practice, unforeseen circumstances, and lack of communication and knowledge. Advocacy strategies used to support the adoption of the CAS guideline were promoting the use of pre-printed orders, discussing the issue at professional practice meetings, and seeking a directive from the organization's senior executive.*

Implications: *Closing the evidence-practice gap will require multi-modal, coordinated efforts such as leadership, professional and patient education, practice support tools, improved inter-professional communication, and engagement with key stakeholders.*

Key words: pre-procedural fasting, NPO, evidence-based practice, nursing advocacy role

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Clinical Highlights

- Multiple barriers and inconsistent practice continues to hamper the uptake of pre-procedural fasting guidelines
- Uptake of research finding unfortunately is often slow and can take several decades. The Canadian Anesthetist Society's pre-procedural fasting guideline, first introduced in the 1990s, is no exception. Traditional unquestioned, prolonged and needless fasting is known to be detrimental to patient outcomes. The CCCN, as an organization, and its individual members are ideally situated to advocate at clinical, organizational, and national policy levels for improved practice.

The traditional practice of keeping all patients nothing per mouth or nulla per os (NPO) after midnight prior to a noninvasive or invasive investigation, intervention or surgery has been challenged for more than two decades because evidence shows that patient outcomes are improved by shortening the pre-procedural fasting time (Canadian Anesthetists' Society, 1990; Merchant et al., 2012). Yet, little is known about cardiovascular (CV) nurses' current knowledge, practice and advocacy about this matter. In this article, the authors discuss the findings of a national survey designed to examine this issue.

Background

The evolution of pre-procedural fasting began in the mid-1800s when the ingestion of food and fluids prior to a procedure was encouraged (Maltby, 2006a). Mendelson (1946) described a catastrophic syndrome of aspiration pneumonitis in obstetrical patients who vomited after receiving inhalation anesthetic. To curtail this problem, an edict of NPO after midnight became widely accepted for all patients, regardless of age or procedure type.

However, Crenshaw (2011), in her summary report of research on preoperative fasting, found that patients who drink clear fluids a few hours before surgery have significantly

lower gastric volumes and similar or higher pH values compared with those who fast overnight, thus lowering the risk of aspiration pneumonitis and increasing patient safety. The incidence of aspiration in healthy patients having elective surgery is rare and cited at one in approximately 10,000 patients, with no deaths in more than 200,000 patients (Warner, Warner, & Weber, 1993). NPO after midnight is not only upheld for cardiac patients having a general anesthetic, but can often be ordered for those undergoing noninvasive or invasive investigations and interventions, like a percutaneous coronary intervention (PCI). Hamid et al. (2014) conducted a retrospective analysis of 1,916 patients undergoing a PCI. No subjects were kept NPO and none required emergency intubation or developed aspiration pneumonia.

The directive may be NPO after midnight but, in actual fact, if a patient's last meal was early evening and their procedure not until the following morning or afternoon they would have been kept in a fasted and dehydrated state for 20 hours or more. Once a patient refrains from eating or drinking the body begins a process to manage the vast detrimental effects related to fasting (see Table 1) (Breuer et al., 2006; Kehlet & Wilmore, 2002; Maclean & Renwick, 1993; Reimer-Kent, 2012a). To help align practice with the irrefutable evidence that patient outcomes improve if they are in a carbohydrate-fed and hydrated state prior to a procedure (Ljungqvist, 2004), anesthesiology societies around the world began in the 1990s to develop liberalized pre-procedural fasting guidelines. Table 2 outlines the Canadian Anesthetists' Society (CAS) guideline (Canadian Anesthetists' Society, 1990; Merchant et al., 2014), which includes contraindications that nurses need to know in order to be a patient's advocate.

The implementation of this guideline has been slow and multiple barriers that involve healthcare providers and patients are given, as reasons for maintaining the status quo. Crenshaw and Winslow (2008) compared healthcare provider practice before and after education and implementation of an evidence-based preoperative fasting policy. Preferring to give everyone the same instruction, believing that patients would not follow individualized instructions and acknowledging the difficulty of changing an entrenched practice were given as rationale for why they found little change in practice. Lack of communication among healthcare providers was also found as a cause for the slow adoption of evidence-based preoperative fasting guidelines (Webb, 2003). Baril and Portman (2007) conducted a qualitative study on the knowledge and perceptions of preoperative fasting with patients (n = 34), nurses (n = 15) and anesthesia care providers (n = 12). They found that practitioners were concerned about a knowledge deficit amongst their peers, whether patients would be compliant with instructions and how they would be able to accommodate unexpected changes in the surgical schedule. Cabana et al. (1999) found facilitators to physicians adopting liberalized fasting guidelines included awareness, familiarity, agreement, self-efficacy, outcome expectancy, ability to overcome the inertia of previous practice and absence of external barriers to perform recommendations.

Nurses' and physicians' knowledge regarding preoperative nutrition was found to be a key factor to changing practice in Crenshaw and Winslow's (2008) quantitative quality improvement project. Woodhouse (2006), in a study of nurses' perceptions and attitudes towards preoperative fasting for elective patients, found that nurses needed to have knowledge regarding preoperative nutrition in order to change practice. The environment wherein nurses work can impede a practice change and may result in maintaining the status quo, even if that practice conflicts with the evidence (Woodhouse, 2006). Millar (2009) found that time constraints to get the work done and pressure to follow a NPO order, even if it was prolonged, were reasons nurses gave for not questioning a fasting order.

Table 1: Detrimental Effects of Prolonged Fasting

- Pre-operative discomfort
- Hunger and dehydration
- High gastric volumes
- Headache, dizziness, irritability and possibly delirium
- Fear and anxiety
- Nausea, vomiting and ileus
- Hypothermia
- Sleep disturbances
- Hypoglycemia and postoperative insulin resistance
- Hypoxemia
- Electrolyte imbalances
- Inotropic support in cardiac surgery
- Possibly ventilator/hospital acquired pneumonia
- Muscle weakness, deconditioning and falls
- Immune system depression
- Poor absorption of amino acids
- Inability to cope with stressors (e.g., blood loss, infection)
- Slower time to full recovery

Table 2: Canadian Anesthesiologists' Society Preoperative Fasting Guideline

According to Merchant et al (2012) fasting policies should vary to take into account age and pre-existing medical conditions and should apply to all forms of anesthesia, including monitored anesthesia care. Emergent or urgent procedures should be undertaken after considering the risk of delaying surgery versus the risk of aspiration of gastric contents. The type and amount of food ingested should be considered in determining the duration of fasting. Before elective procedures, the minimum recommended fasting time should be:

- 8 hours after a meal that includes meat, fried or fatty foods;
- 6 hours after a light meal (such as toast and clear fluid) or after ingestion of infant formula or non-human milk;
- 4 hours after ingestion of breast milk (no additions are allowed to pumped breast milk);
- 2 hours after clear fluids.

Contraindications: Conditions likely to impair gastrointestinal (GI) motility or provoke gastro esophageal reflux.

Patient factors have also been identified in relation to the uptake of the CAS guideline. Baril and Portman (2007) found that nurses and anesthesia care providers had a general mistrust that patients would follow their individualized fasting instructions, as a rationale for maintaining excessive fasting times. Studies on patient compliance are few and the results vary. Kramer (2000) found 98.4% of patients (n = 122) were compliant with detailed preoperative NPO instructions. Likewise, Walker, Thorn and Omundsen (2006), in a study of 100 preoperative patients, found a compliance rate of 98% although only 22% of patients comprehended why they needed to remain fasting and 4% stated they would misrepresent their fasting status if it would be inconvenient for them to have their surgery postponed.

Prolonged pre-procedural fasting is an issue that requires nursing attention. Knowledge is a precursor to practising in accordance with evidence and to being an effective patient advocate. As demonstrated in this review of the literature, education alone is not the answer to overcoming barriers, rather a multimodal change management approach is recommended to help close the evidence-practice gap.

Purpose

This project is a synopsis of the first author's Master of Science in Nursing Capstone Project, which entailed an online survey that examined the current state of knowledge, practice and advocacy role of Canadian CV nurses in promoting the CAS guideline (Millard, 2015). Specific questions were:

1. How do Canadian CV nurses describe their current knowledge, practice and advocacy role as it pertains to pre-procedural fasting?
2. What factors influence a CV nurse to be an advocate for the implementation of the CAS guideline?
3. How can the evidence-practice gap in relation to pre-procedural fasting be closed?

Method

Design

Guided by the Promoting Action on Research Implementation in Health Services (Rycroft-Malone, 2004) knowledge translation framework, the project design involved a review of the literature on pre-procedural fasting, and the design and implementation of a survey. In this paper, we present the results and discuss these in relation to the existing evidence.

Sample

The Canadian Council of Cardiovascular Nurses (CCCN) is a national nursing specialty organization whose aim is "advancing CV nursing through leadership, advocacy, research and knowledge translation" (Canadian Council of Cardiovascular Nurses, 2016). At the time of the survey there were 550 members from a wide array of cardiac clinical areas and with diverse nursing roles. The CCCN membership was selected as the target sample for its convenience and ease of access. We were unable to determine how applicable the topic was to the individual member, so all were invited to participate. Inclusion criteria included English-speaking CV nurses who were current members of the CCCN, had access to a computer and were willing to complete the online survey. Ethics approval was obtained from the university's Research Ethics Board, and permission to access the membership was granted by the CCCN Board of Directors. To ensure the subjects' anonymity and confidentiality, the survey was distributed through the CCCN national office. An initial invitation to participate was sent out followed by two reminders via the organization's e-newsletter. With the two reminders, a response rate of 11% (n = 63) was achieved, of which 51 surveys were deemed complete and these data were entered for analysis.

Instrument

As no suitable research instrument was found, we designed a questionnaire that addressed the project's concepts of interest. The first section probed CV nurses' knowledge and asked whether they were aware of the recommended time a patient should fast prior to a procedure. The second section asked questions about practice related to NPO in their clinical area, and the third section examined the advocacy role these nurses played in promoting the CAS guideline. The fourth section collected demographic data. Each section gleaned quantitative (e.g., Likert scale) and qualitative (e.g., open-ended questions with narrative responses) data. To ensure content validity, six subject matter experts reviewed the survey and minor edits were made based on their feedback.

Procedures

Once ethics approval was obtained, recruitment was initiated through the CCCN, and the national head office acted as a third-party distributor for getting the survey to their members. An email was sent to the membership with a letter of information and a link to the survey (FluidSurvey™), with two follow-up emails. In addition, a promotional flyer was distributed at the October 2014 CCCN Annual General Meeting and Scientific Sessions in Vancouver, British Columbia. Two reminders were sent and after 10 weeks of recruitment the survey was closed and we proceeded to data analysis.

Data Analysis

The online survey was administered via FluidSurvey™, which supports descriptive statistical analysis. As described by Elo and Kyngas (2008), content analysis of narrative responses involved an inductive process of developing sub-categories and categories specific to each of the three main concepts under study. Taken together, the statistical and content analyses allowed deeper interpretation of the current knowledge, practice and advocacy role of Canadian CV nurses pertaining to pre-procedural fasting.

Findings

Demographic data (provided by 43 of the 51 respondents) revealed that the majority of the sample was female (n = 35, 81%). The most common age range was between 51 to 60 years (n = 16, 37 %). One-third of the sample had more than 30 years of nursing experience (n = 14, 33%). More than half held a Bachelor of Science in Nursing (BSN) degree (n = 23, 53%), with another 11 (26%) nurses holding MSN, three (7%) nurses holding a PhD, and one with a post doctorate, as highest level of education. Forty-four percent (n = 19) worked as direct care nurses in a 500-plus bed hospital. The most common clinical areas represented were coronary care unit (16%), interventional cardiology (16%), post recovery unit (12%) and intensive care unit (ICU)/step down unit (12%).

Nurses' Current Knowledge

All respondents indicated they were knowledgeable about pre-procedural fasting in general. There were no prompts in this question as to what the recommended fasting time should be, as it was designed to see if later in the survey they were also knowledgeable about the CAS guideline, which less than half (42%) were. Using a four-point Likert scale, respondents were asked to indicate their level of agreement (i.e., strongly agree, to strongly disagree) with the following statement: *"I believe all elective cardiac patients should be kept NPO (food and fluids) after midnight prior to their procedure"*. Twenty-four percent agreed and 10% strongly agreed with this statement, indicating a further knowledge gap for one-third of the respondents.

Those who were aware of the CAS guideline (42%) first learned about it through multiple ways (e.g., word-of-mouth, 72%, clinical practice guidelines, 67%, independent reading/study, 41%, and in-services/formal education, 21%). Only four subjects had received any education on the CAS guideline within the past year, which had occurred during the implementation of an ICU clinical practice guideline. Even though the CAS guideline has been in place since 1990, most respondents (90%) reported they had been taught in their entry-to-practice nursing program to keep patients NPO after midnight.

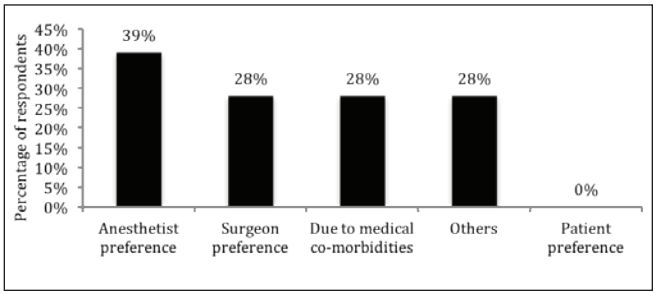

Figure 1: The circumstances where the CAS pre-procedural fasting guideline is NOT being implemented in the clinical setting.

Nurses' Current Practice

The survey also asked nurses about current NPO practice. Fifty-five percent of the respondents stated that in the past three months they had instructed a patient to be NPO after midnight prior to a CV procedure. Fifty-two percent had heard a patient question their NPO after midnight instructions and 74% had heard a patient question being able to drink prior to their procedure. Reasons for a lack of patient questioning included a belief that they lacked knowledge; for example, that patients may not realize that prolonged fasting has detrimental effects. Four subthemes were found based on the 44 comments to the question *"What barriers in your clinical area prevent the CAS evidence-based fasting guideline from being implemented"*? These included inconsistent medical practice, unforeseen circumstances, lack of communication and a knowledge gap.

Inconsistent medical practice. Overall, there was concern regarding inconsistent medical practice and a lack of willingness to change. This was derived from comments like: *"Each anesthesiologist has a different opinion and request in regard to fasting guidelines. Some won't do the procedure even if the patient has chewed gum or had a candy within six hours of the procedure", "physicians take offence to being challenged"*, and *"I wonder if the anesthetists themselves are aware of these guidelines, since I have never seen fasting orders given according to these guidelines."*

Inconsistent medical practice was also a feature in the quantitative data, which found that 62% of the respondents indicated that the CAS guideline was often or always implemented, inferring that 38% of the time it was not. Without practice support tools, like standardized institution-oriented clinical practice guidelines and pre-printed orders, compliance became an issue: "*We have pre-printed orders for some cardiac procedures that fall within these guidelines, but for other (procedures) there are no formal guidelines, therefore it differs from each physician."* Figure 1 shows the circumstances in which the CAS guideline was not implemented and subjects were able to choose more than one option. Data revealed that 69% of the time it was provider-related (anesthetist preference, 39%, surgeon preference, 28%) versus 56% of the time patient-related (medical co-morbidities, 28 %, other reasons e.g., emergent cases and lack of a patient care plan, 28%).

Unforeseen circumstances. Statements that support the assertion that unforeseen circumstances were barriers to CAS guideline implementation included *"Mostly the barriers are the shift of patient's procedure times. We often have emergencies or add-ons who bump the regular slate"*; *"for the most part if someone is fasting longer than six hours it is because the procedure wait has been lengthened due to acuity of another patient or the inability of the cath[eter] lab to state exactly how many patients they can get done…"* Unforeseen circumstances comprised patients who had been waitlisted, whether they had been seen and if pre-procedural medications had been taken.

It also included patients fasting who were too ill (e.g., unable to lie flat, vomiting, diarrhea) to have their procedure.

Lack of communication. Lack of communication, especially to the nursing staff from the procedure room, was a barrier revealed through statements, like "*Poor communication to nursing in regard to when client is to be booked… [as well,] lack of communication between scheduling of cases and the reality of when the patient actually goes"* and *"delays in surgical times."* Poor communication among care providers (e.g., physicians, nurses, clinical dieticians) was also cited 70% of the time, as a factor that blocked collaborative efforts in ensuring pre-procedural fasting time was shortened.

Knowledge gap. Respondents readily indicated that a knowledge gap was a contributor to maintaining the status quo in comments such as *"NPO at midnight is prescribed in most charts and if not, we do it out of habit!"* and *"Staff are resistant to change of practice if there has been no formal education around the issue."*

Nurses' Current Advocacy Role

The concept of advocacy was examined through a series of questions that probed what respondents had done on a micro or macro level to change practice. Findings of this survey provide evidence that across Canada CV nurses are using multimodal advocacy strategies. Fifty-four percent of respondents had questioned a prescriber's NPO order. Comments included *"Other procedures are blanket NPO from midnight, however when I have asked I have been able to provide fluids up until three hours prior"* and *"I've talked to them about specific patients, but never a generalized approach for everyone based on evidence."* The respondents used their knowledge and expert clinical judgment as tools to support advocacy on a case-by-case basis. If nurses knew about the evidence they were more likely to talk about the issue with a member of the healthcare team: staff nurse (79%), physician (74%), anesthetist (21%), other (21%), nurse practitioner (5%) and clinical dietitian (5%) (See Figure 2).

System-wide changes tended to involve changing and embedding the guideline into pre-printed orders. Other changes nurses advocated for included healthcare provider education and patient teaching material. Thirty-three percent (n = 15) of participants indicated their organization had a written policy that adhered to the CAS guideline. Six percent (n = 3) had advocated on the issue through a professional nursing organization, like the Canadian Nurses Association. Advocacy was influenced through activities such as reading evidence-based publications (94%), dialoguing with members of the inter-professional healthcare team (91%), following clinical practice guidelines (91%), and listening to a presentation by a subject matter expert (79%).

The survey included the question, *"Who in your organization supports pre-procedural fasting guidelines?"* Respondents were given a predetermined list and asked to choose all that applied. Figure 3 reveals the biggest supporters were most responsible physician (80%), staff nurse (68%), anesthetist (62%) and patient care coordinator/charge nurse (45%). The least supportive at 7% were the senior executive team (e.g., Chief Executive Officer or Vice President).

Strategies that influenced the adoption of the CAS guidelines included pre-printed orders (27%), discussing at a unit level Professional Practice Council meeting (22.5%), receiving a directive from the organization's senior executive team (18%), holding an educational blitz or rollout (17 %), and receiving a directive from the Ministry of Health (16%). Less frequently mentioned strategies that influenced the adoption of the CAS guidelines were questioning individual practices that fall outside the guidelines (5%) and hearing complaints from patients (3%) (See Figure 4). Important here is that none of the strategies stood out from the rest as very influential.

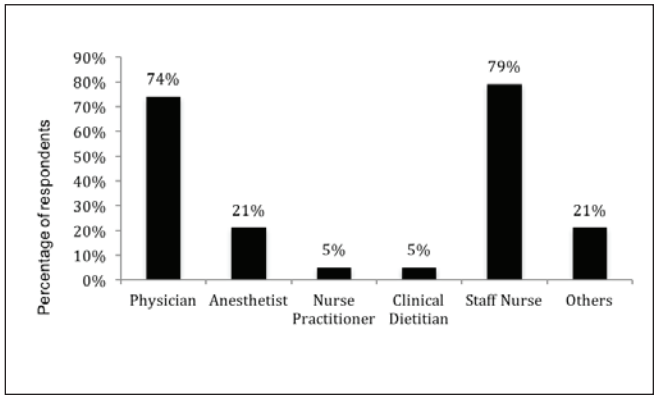

Figure 2: Healthcare team member spoken to about the evidence that support limiting pre-procedural fasting time.

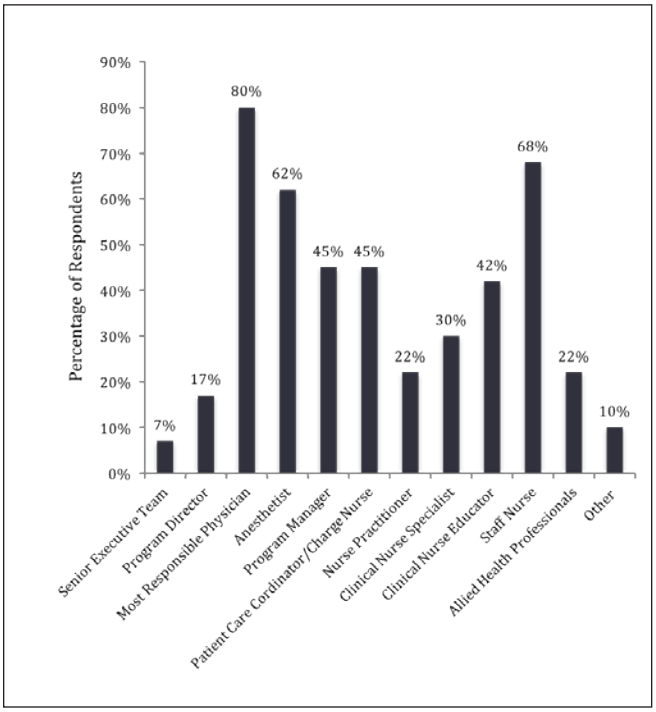

Figure 3: Who in your organization supports pre-procedural fasting guidelines?

Discussion

Our findings support the assumption that some CV nurses remain unaware of the CAS guideline and the impact on patient outcomes from prolonged fasting. Whether participants were aware of the guideline (42%) or not (58%), the majority (68%) did not agree that all patients should be kept NPO after midnight. Although this finding is encouraging, it is unclear how respondents formed this opinion. Of note was the finding that even with knowledge of the guideline, in the past three months, 53% had instructed a patient to refrain from eating or drinking after midnight prior to the procedure. In some cases, factors within the clinical setting were in direct conflict with how nurses believed they should practise. Perhaps these participants were similar to those in Millar's study (2009) who did not question practice due to time constraints and pressures within the clinical setting. Our findings support those of Bosse, Breuer and Spies (2006) that clinical staff often abides by a traditional NPO policy because they believe it is safer and simpler to follow.

A majority of participants (90%) recalled being taught in their entry to practice education program about pre-procedural fasting. Despite data from researchers such as Warner et al. (1993) that bronchial aspiration is a rare occurrence and not grounds for maintaining NPO after midnight, nursing textbooks like Black, Hawks and Keene (2001) continue to reinforce the status quo, making it more likely that many participants in our study would not have received this information. Entry to practice education can be very impactful on students, as they attempt to learn an immense amount of information that will be foundational to their practice. Student nurses may well make the assumption that they are being taught the latest evidence and bring this knowledge into their practice setting once they graduate. Only more recently have nursing textbooks addressed the importance of maintaining normal pre-procedural fluid and electrolyte balance and make reference to what should be the minimum fasting time prior to an elective procedure (Kozier et al., 2013; Potter, Perry, Stockert, & Hall, 2013).

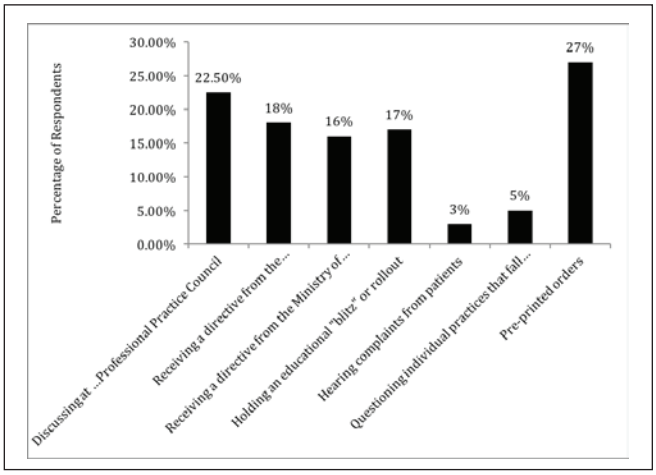

Figure 4: Influential strategies in the adoption of the evidence-based CAS pre-procedural fasting guideline.

Of the 23 nurses who knew about the CAS guideline, 72% of respondents first learned about the CAS guideline by word of mouth. This informal method is a strategy of communication often encouraged within a formalized professional practice council framework and is a non-threatening way in which information is disseminated. Nurses are also taught about evidence-based practice in their clinical settings through in-service or formal education, and yet this was the least-frequently cited (21%) method for learning about the CAS guideline. It is encouraging to see that 41% of the respondents did independent reading/study on the topic.

Pre-printed orders and clinical practice guidelines were cited as examples of practice support tools that helped with using the guideline by the 62% of the respondents who knew about its existence. This is a good start, as the mere existence of a clinical practice guideline or pre-printed order does not necessarily result in its implementation (Anderson & Comrie, 2009; Bosse et al., 2006). Barriers in our study that could make implementation a challenge were inconsistent medical practice, unforeseen circumstances, lack of communication and a lack of knowledge. Ongoing education and an evaluation plan are required for a guideline to be successfully implemented into practice (Reimer-Kent, 2012a).

Maintaining the practice of NPO after midnight may reflect a need to keep the system moving in a well-coordinated manner and accommodate the unexpected, like a change to the procedural schedule. It is hard to predict unforeseen circumstances. If the procedure schedule is altered due to patient acuity or urgency, the scheduled patient is understandably 'bumped' and will continue to fast for an indeterminate period of time. Interestingly, the urgent patient may not have fasted, but is still able to undergo the procedure without resulting aspiration pneumonitis. This emphasizes that aspiration is a very rare complication (Hamid et al. 2014; Thorpe & Benger, 2010; Warner et al. 1993). Sakai et al. (2006) go as far as to say that pulmonary aspiration is largely preventable with improved aggressive gastric reflux prophylaxis and/or airway control strategies.

Effective communication is very important among healthcare providers and yet, nurses avoided speaking with an anesthetist about fasting instructions, even though this is the care provider most likely to write the fasting orders and it is the anesthesiologist society that published a guideline (Bosse et al., 2006). Woodhouse (2006) suggests it takes a willingness by self-assured and knowledgeable nurses to question medical instructions. This fits with a comment from one respondent that without knowledge *"… I can't speak with authority on this matter"*. Asking pertinent questions regarding standing orders sets can be a challenge for some direct care nurses and their efforts should be supported within their practice environment.

Increased knowledge of nurses about current evidence will help build their confidence, so they can openly question practice and advocate for change (Crenshaw & Winslow, 2008). Despite the fact that medical associations and societies, like the

CAS, write guidelines, Anderson and Comrie (2009) point out that these are optional tools and not to be confused with standards or policies. Consistent medical practice and sustainable implementation are critical factors because according to Bosse et al. (2006) the best guideline is useless unless it reaches the intended target… in this case the patient.

Limitations

This research is valuable, as it is the first known study to query Canadian CV nurses' knowledge, practice and advocacy role as it pertains to pre-procedural fasting. There were, however, limitations. Caution should be taken when interpreting the results due to the small sample size and the results cannot be interpreted as being representative of all Canadian CV nurses. The research instrument designed by the authors was vetted by subject matter experts, but did not undergo psychometric testing.

Implications for Practice

The Agency for Healthcare Research and Quality (2002) speaks to the fact that it can take two decades before evidence becomes routine clinical practice. It is more than 25 years since the CAS guideline was first published and it is still not common or consistent practice. NPO after midnight is deeply entrenched within healthcare and the general public. This assumption is even reinforced in children's books, like *Franklin Goes to the Hospital* (Bourgeois, 2013) where Franklin is kept NPO after midnight to prepare for his surgery. This children's book is read by thousands of adults to thousands of children and is endorsed by large medical centres, like the Seattle Children's Hospital (http://www.seattlechildrens.org/patients-families/clinic-visit/preparing-your-child/). This is an example of how the general public can have outdated practice reinforced, which perpetuates the challenge healthcare providers have in trying to close the evidence-practice gap. Nurses need to ensure that patient instructions are current, including written material and hospital websites. They can also validate that patients understand their instructions through educational methods, like teach-back.

In terms of patient safety, pulmonary aspiration is deemed largely preventable. Nurses involved in immediate post-procedure care need to be aware of how the patient is positioned. If appropriate, the recovery position should be used to keep the airway clear and open. Nurses should also advocate for preoperative orders that include appropriate gastric reflux prophylaxis.

If we are to break through this deeply entrenched practice, clearly there needs to be greater emphasis on ongoing education directed at increasing the knowledge level of the inter-professional team. The work environment needs to foster healthy relationships and the culture within practice should support and encourage questioning in a non-threatening and non-punitive manner. As nurses play an integral role in fostering healthy intra- and inter-departmental relationships, they need to be skilled negotiators and articulators when communicating within the healthcare team, as well as with patients and their families. Knowing and understanding the evidence is crucial if direct care nurses want to be effective advocates, as it is they who coordinate the patient's journey across the care continuum.

Nurses need to ensure that a hydrated and carbohydrate-fed patient enters a procedure room (Reimer-Kent, 2010). They need to understand that solid food is distinctly different from fluid. As stated previously, NPO after midnight is misleading, as patients usually do not eat after their supper. A nursing advocacy strategy could be to ensure that all pre-procedure patients consume an evening snack, which would help shorten the time a fasting patient is without solid food (Reimer-Kent, 2012b).

Although not questioned in this study, it would be interesting to explore how nurses thought about following a prescriber's order that made them practise against known evidence. The knowledge of being constrained in their nursing practice could potentially lead to an ethical dilemma. Overcoming barriers to full implementation of the CAS pre-procedural guideline will require efforts from all levels of the organization.

Conclusion

The findings reveal some Canadian CV nurses have a gap in knowledge about the CAS guideline. There are also various perceived barriers to its implementation in practice. On the positive side, there is confirmation that nurses do play an advocacy role in promoting this evidence-based pre-procedural fasting guideline.

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