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Original Research

Emergency Department Management of Diabetic Ketoacidosis and Hyperosmolar Hyperglycemic State: National Survey of Attitudes and Practice

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ABSTRACT

Objectives: In 2013, the Association, now Diabetes Canada, published national clinical practice guidelines for the effective management of diabetic ketoacidosis and hyperosmolar hyperglycemic states in adults. We sought to determine emergency physician compliance rates and attitudes toward these guidelines and to identify potential barriers to their use in Canadian emergency departments.
Methods: An online survey consisting of questions related to the awareness and use of the *Canadian Diabetes Association 2013 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada* was distributed to 500 randomly selected members of the Canadian Association of Emergency Physicians. Also included in the survey were 3 clinical vignettes to assess adherence rates to the guidelines.
Results: The survey response rate was 62.2% (311 of 500). The majority of physicians reported the guidelines to be useful (83.6%); 54.6% of respondents were familiar with the guidelines, and 54.7% claimed to use them in clinical practice. The most frequently reported barrier to guideline implementation was a lack of education (56.0%). The clinical vignettes demonstrated respondent variability in fluid administration and sodium bicarbonate administration, as well as some variability in insulin and potassium administration.
Conclusions: Although Canadian emergency physicians were generally supportive of the guidelines, many were unaware that these guidelines existed, and barriers to their implementation were reported. These results suggest the need to improve knowledge translation strategies across Canadian emergency departments to standardize management of diabetic ketoacidosis and hyperosmolar hyperglycemic states and support the highest quality of patient care, as well as to ensure that future guidelines include management strategies applicable to the emergency department setting.

Mots clés :
acidocétose diabétique
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syndrome d'hyperglycémie hyperosmolaire
lignes directrices

RÉSUMÉ

Objectifs : En 2013, l'Association canadienne du diabète dorénavant appelée Diabète Canada, publiait les lignes directrices nationales de pratique clinique pour une prise en charge efficace de l'acidocétose diabétique et du syndrome d'hyperglycémie hyperosmolaire chez les adultes. Nous avons cherché à déterminer les taux de conformité et les attitudes des médecins d'urgence à l'égard des lignes directrices, et à identifier les obstacles potentiels à leur utilisation dans les services des urgences du Canada.
Méthodes : Cinq cents membres de l'Association canadienne des médecins d'urgence choisis de manière aléatoire ont reçu un sondage en ligne comportant des questions au sujet de leur connaissance et de leur utilisation des lignes directrices *Lignes directrices de pratique clinique 2013 de l'Association canadienne du diabète pour la prévention et la prise en charge du diabète au Canada*. Trois vignettes cliniques ont également été incluses au sondage pour évaluer le respect des lignes directrices.

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Résultats : Le taux de réponse au sondage était de 62,2 % (311 sur 500). La majorité des médecins rapportaient l'utilité des lignes directrices (83,6 %) ; 54,6 % des répondants connaissaient les lignes directrices, et 54,7 % prétendaient les utiliser dans la pratique clinique. Le manque de formation constituait l'obstacle à la mise en œuvre des lignes directrices le plus fréquemment rapporté (56,0 %). Les vignettes cliniques démontraient la variabilité entre les répondants dans l'administration des fluides et l'administration du bicarbonate de sodium, ainsi qu'une certaine variabilité dans l'administration de l'insuline et du potassium.
Conclusions : Bien que les médecins d'urgence du Canada se soient généralement montrés favorables aux lignes directrices, beaucoup ignoraient leur existence et rapportaient les obstacles à leur mise en œuvre. Ces résultats montrent qu'il est nécessaire d'évaluer les stratégies d'application des connaissances dans tous les services d'urgence du Canada pour uniformiser la prise en charge de l'acidocétose diabétique et du syndrome d'hyperglycémie hyperosmolaire, et d'appuyer des soins aux patients de la plus grande qualité, et de veiller à ce que les futures lignes directrices comportent des stratégies de prise en charge applicables aux services des urgences.

Introduction

Diabetes mellitus is an increasingly prevalent chronic disease affecting an estimated 2 million Canadians, representing approximately 6.7% of the population (1). Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS) are common, acute metabolic complications of decompensated diabetes mellitus characterized by an absolute or relative insulin deficiency. Common precipitants to these hyperglycemic events include medication noncompliance, infection such as pneumonia and urinary tract infection, and myocardial ischemia (2). If not effectively managed, these 2 conditions can lead to significant morbidity and mortality. The estimated mortality rate for DKA ranges from 1% to 5%, whereas the rate for HHS ranges from 5% to 20% (3). Many patients who have experienced DKA or an HHS, after being discharged from the hospital, have poor outcomes or return to the emergency department (ED) and require admission (4).

Because it is the emergency physician (EP) who initially stabilizes and treats these patients, it is important that appropriate evidence-based management guidelines be followed to ensure a standard of care for all patients in an attempt to prevent these adverse outcomes. Multiple studies have demonstrated improved patient outcomes after the implementation of a standardized DKA protocol, such as decreased hospital lengths of stay and decreased times to ketone clearance and correction of the anion gap (5,6). In Canada, clinical practice guidelines for these hyperglycemic emergencies were published in 2013 by the Canadian Diabetes Association (CDA) using an expert committee representing the most current evidence-based data for health-care professionals to ensure a standardization of care and improved clinical outcomes (7). This includes intravenous fluid resuscitation, electrolyte replacement, administration of insulin, correction of acidemia with bicarbonate when appropriate, and identification and treatment of any precipitating causes (7). However, despite the presence of established treatment guidelines for DKA and HHS, there continues to be an issue of significant practice variation and compliance rates among Canadian EPs with treatment targets not being met, including variable fluid, insulin and potassium administration, as well as premature cessation of insulin infusions and reopening of the anion gap (8,9). To date, physician attitudes toward these guidelines and their use in the ED have not been well described in the literature.

The primary objectives of this study were to determine Canadian EPs' familiarity with and use of the 2013 CDA guidelines and to identify any physician-perceived barriers to their implementation in Canadian EDs. We also sought to assess the practice variability among EPs in comparison with the guidelines. Secondary objectives were to determine physician attitudes toward patients who repeatedly present to the ED with hyperglycemic emergencies, as well any additional factors that influence disposition decisions.

Methods

Study design and population

In this cross-sectional study, a self-administered online survey was distributed to 500 randomly selected members of the Canadian Association of Emergency Physicians (CAEP) who had granted the organization permission to contact them for prospective research. Members who were not physicians or not currently practising clinical emergency medicine were excluded. On our behalf, CAEP randomly distributed the survey using Survey Monkey (http://www.surveymonkey.com) on day 1 along with an e-mail message informing the participants about the goals of the study. Two follow-up e-mail messages were distributed on days 7 and 14. Consent to participate in the study was implied by completion of the survey. Approval was obtained from the Ottawa Hospital's Health Science Network Research Ethics Board. The survey was administered between July and September of 2015.

Survey instrument

The content of our survey was pilot tested with 5 Canadian EPs from 2 tertiary academic centres to ensure face and content validity. In its final version, the survey consisted of 23 questions including demographic and work characteristics of ED physicians, with 16 of the questions relating to physician management of DKA and HHS in the ED (Figures 1 and 2). A flowchart of the 2013 CDA guidelines was included in the survey (Figure 1), and participants were asked to rate their familiarity with, use of and overall impression of the guidelines by using a 7-point Likert scale. Other questions attempted to identify physician-perceived barriers to guideline implementation. Included in the survey were 3 clinical vignettes (Figure 2) with different presentations of DKA and HHS and options for selecting investigations and treatment options to determine whether responses were consistent with guideline recommendations. We also sought to determine which disposition factors respondents believe to be important when discharging patients from the ED. In addition, we addressed physician attitudes toward patients with repeat visits to the ED with hyperglycemic emergencies.

Outcome measures

The primary outcome measures were physician-reported familiarity, use and usefulness of the 2013 CDA guidelines as rated with a 7-point Likert scale, as well as any physician-perceived barriers to guideline implementation in the ED and the current practice variability among physicians in comparison with the guidelines. Secondary outcomes included physician attitudes toward patients who