



# Characterizing the Clinical Presentation of Diabetic Ketoacidosis Hospitalizations in People with Diabetes using Admitting Diagnoses

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## BACKGROUND

- Diabetic ketoacidosis (DKA) remains a life-threatening emergency for people with diabetes (PWD)<sup>1</sup>
- Symptoms and signs for DKA can be ambiguous<sup>2</sup> (e.g. being confused for a stomach flu) which may lead to a potential delay in diagnosis and treatment
- Our aim was to quantify the extent to which the admitting diagnosis codes were specific to DKA versus non-DKA, ambiguous and/or gastrointestinal (GI)-related

## METHODS

- Study population: individuals with T1DM or T2DM with a hospitalization for DKA (as primary ICD-10 diagnosis)
- Study period: January 2017 – March 2025
- Data source: CMS Limited Data Set, including Medicare and dually eligible Medicaid beneficiaries
- Analysis: descriptively summarized the admitting diagnoses (ICD-10) for DKA hospitalization:
  - Proportion that were DKA vs other
  - Proportion of non-DKA admitting diagnoses that were deemed nonspecific/ambiguous, per expert input
  - Proportion of nonspecific/ambiguous that were GI-related, per expert input
- Note: the admitting diagnosis in CMS data represents the physician’s working diagnosis at the time of inpatient care admission.<sup>3,4</sup>

## REFERENCES

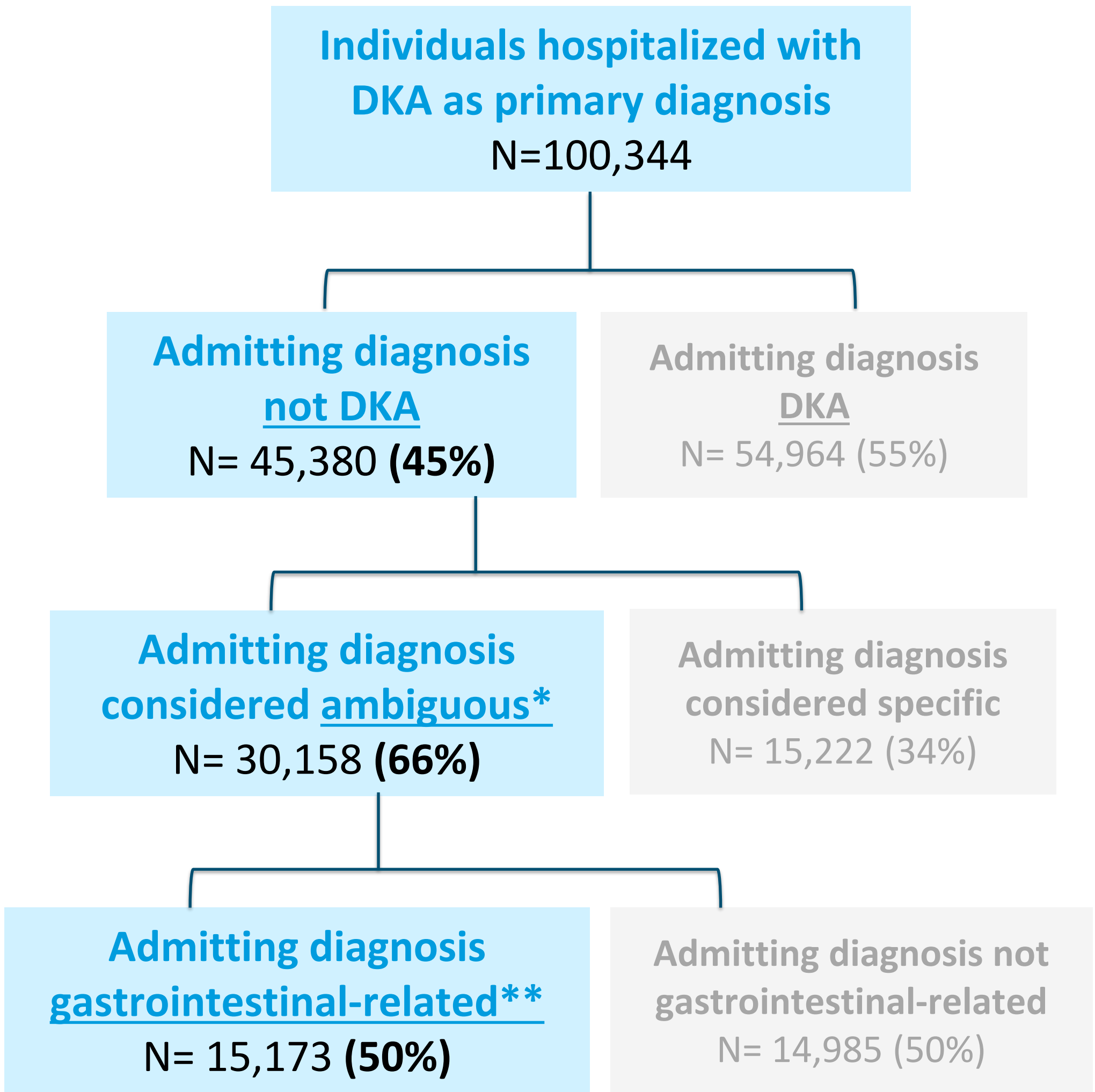
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**Table 1. Summary of 30 most common admitting diagnoses among PWDs hospitalized for DKA**

| Admitting Diagnosis code (ICD-10) | ICD-10 Code Description                                                  | Number of individuals |
|-----------------------------------|--------------------------------------------------------------------------|-----------------------|
| R112                              | Nausea with vomiting, unspecified*,**                                    | 7,483                 |
| R739                              | Hyperglycemia, unspecified                                               | 6,785                 |
| R4182                             | Altered mental status, unspecified*                                      | 6,152                 |
| R531                              | Weakness*                                                                | 4,095                 |
| R109                              | Unspecified abdominal pain*,**                                           | 2,711                 |
| E1165                             | T2D with hyperglycemia                                                   | 2,733                 |
| R1110                             | Vomiting, unspecified*,**                                                | 2,066                 |
| R0602                             | Shortness of breath*                                                     | 1,748                 |
| E1065                             | T1D with hyperglycemia                                                   | 1,371                 |
| E860                              | Dehydration*,**                                                          | 1,233                 |
| E875                              | Hyperkalemia*                                                            | 1,143                 |
| R079                              | Chest pain, unspecified                                                  | 1,107                 |
| N179                              | Acute kidney failure, unspecified                                        | 779                   |
| A419                              | Sepsis, unspecified organism                                             | 686                   |
| R110                              | Nausea*,**                                                               | 656                   |
| E872                              | Acidosis                                                                 | 647                   |
| R5383                             | Other fatigue*                                                           | 625                   |
| R42                               | Dizziness and giddiness*                                                 | 612                   |
| R410                              | Disorientation, unspecified*                                             | 610                   |
| R55                               | Syncope and collapse                                                     | 588                   |
| E1100                             | T2D with hyperosmolarity with nonketotic hyperglycemic-hyperosmolar coma | 419                   |
| R1013                             | Epigastric pain*,**                                                      | 338                   |
| R569                              | Unspecified convulsions                                                  | 310                   |
| R1084                             | Generalized abdominal pain*,**                                           | 257                   |
| G9341                             | Metabolic encephalopathy                                                 | 261                   |
| E871                              | Hypo-osmolarity and hyponatremia                                         | 256                   |
| K920                              | Hematemesis                                                              | 237                   |
| K3184                             | Gastroparesis*,**                                                        | 206                   |
| N390                              | Urinary tract infection, site not specified                              | 225                   |
| R197                              | Diarrhea, unspecified*,**                                                | 223                   |

\* ‘Ambiguous’ defined by the admitting diagnosis codes in Table 1 with \* symbol, based on expert input  
\*\* ‘Gastrointestinal-related’ defined by the admitting diagnosis codes in Table 1 with \*\* symbol, based on expert input

**Figure 1. Classification of admitting diagnoses among PWDs hospitalized for DKA: proportions that were non-DKA, considered ambiguous, and GI-related**



## RESULTS

- Of 13,461,994 individuals with T1DM or T2DM, N=100,334 had a DKA hospitalization in the study period
- N=45,380 (45%) of those had an admitting diagnosis that was not DKA, which was consistent by type of diabetes
- N=30,158 (66%) of these had admitting diagnoses that were deemed ambiguous/non-specific (e.g. altered mental status, fatigue, weakness, GI symptoms \*)
  - Note: based on 30 most common admitting diagnoses (ICD-10) only
- N=15,173 (50%) of these with ambiguous admitting diagnosis codes were GI-related symptoms (e.g. nausea, vomiting, abdominal pain, diarrhea \*\*)

## CONCLUSION

- Nearly half of the PWD hospitalized for DKA had alternative admitting diagnoses, suggesting DKA cases are often difficult to identify initially
- The non-DKA admitting diagnoses were largely nonspecific, and were often GI-related
- These findings highlight the need for tools and strategies that enable earlier and more accurate detection of DKA
- Any delay of diagnosis and treatment of DKA may increase length of stay and mortality, especially in older adults
- Tools to improve the initial identification of DKA could reduce a potential delay in diagnosis and proper treatment

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