



In the Range: Real Talk on Diabetes Monitoring Best Practices

Episode 5:
A New Lens on DKA: Leveraging
the Latest Tech for Improved
Patient Outcomes



**Cornerstone
Medical
Education**

AA CME[®]
AMERICAN ACADEMY OF CME, INC.

Presented by Cornerstone Medical Education and American Academy of CME.
Supported by an educational grant from Abbott Diabetes Care.



Burden of DKA

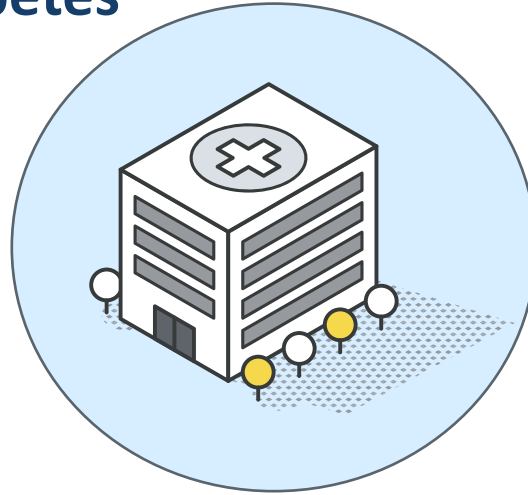
Burden of DKA: What We've Known



Burden of DKA in People with Diabetes

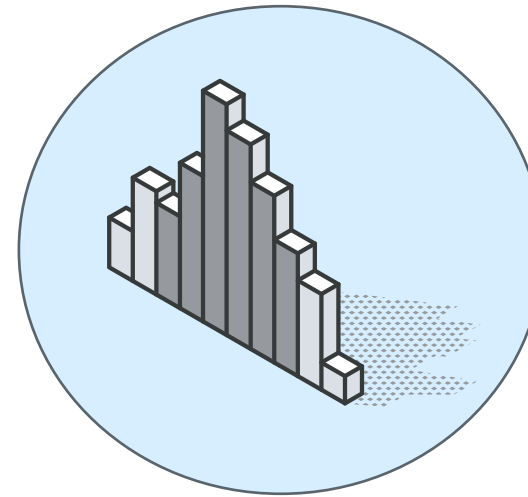


Most common hyperglycemic emergency in persons living with diabetes



DKA is a leading cause of death among children and adults (< 58) with diabetes

T1D



1%–13% annual prevalence of DKA in adults with T1D across countries

T2D



Hospitalization for DKA: 1 in 5 cases attributed to T2D



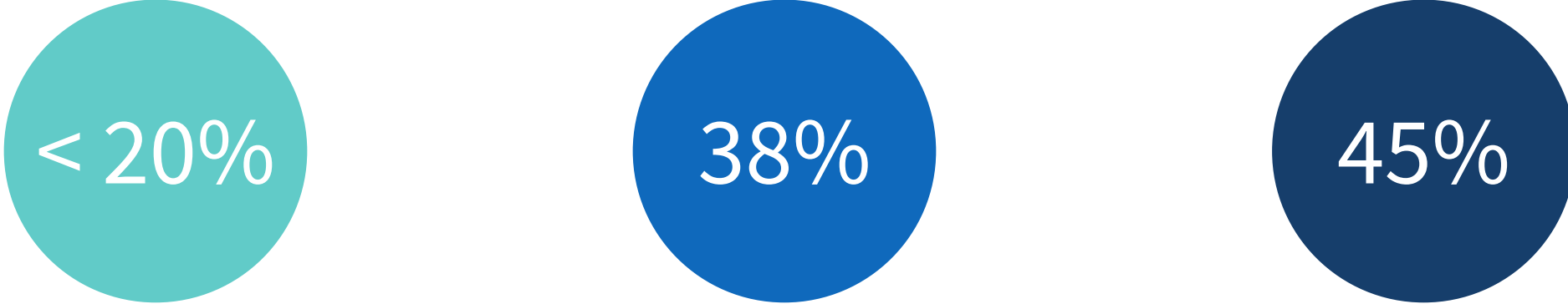
Higher mortality for T2D (0.85%) with DKA than T1D (0.2%)

Umpierrez GE, et al. *Diabetes Care*. 2024; Nguyen KT, et al. *JDST*. 2022; Zhong VW, et al. *Diabetes Care*. 2018; Canales SP, et al. *Endocrine Pract*. 2024.

Burden of DKA: Why is it Such a Problem?



Lack of Self-Monitoring



< 20%

Test ketone levels, even
when glucose is > 16.7
mmol/L for
1 hour or more

38%

Never test ketones
when nauseated and/or
vomiting

45%

Never test ketone levels
when they
detect a fever

Current ketone monitoring is intermittent, reactive, and dependent on patients recognizing symptoms and testing at the right time.

Albanese-O'Neil A, et al. *Diabetes Care*. 2017; Viridi N, et al. *Diabetes Technology & Therapeutics*. 2023.

Rising Burden of DKA over 21 Years



- Long-term real-world data on DKA in UK adults: incidence, recurrence, and predictors in type 1 (T1DM) and type 2 diabetes (T2DM) using linked primary and secondary care records (1999 to 2019)
- Results: (N=78,856 T1, N=577,088 T2)
 - 16.4% of T1D and 1.29% of T2D experienced at least 1 DKA episode
 - Annual incidence rose from 1.21% to 4.17% (T1D), and 0.06% to 0.34% (T2D)
 - Of those who experienced DKA, recurrence affected 31.5% of people with T1D and 12.1% with T2D
 - **Recent DKA was the strongest predictor of recurrence**
 - Other predictors included: female sex, younger age, socioeconomic deprivation, multimorbidity

Table 1– Adjusted predictors of first DKA

Predictor	T1DM IRR (95 % CI)	T2DM IRR (95 % CI)
Female vs male	1.42 (1.34–1.50)	1.27 (1.19–1.35)
Age 40–64 y vs 18–39 y	0.47 (0.43–0.50)	0.40 (0.35–0.45)
Age ≥ 75 y vs 18–39 y	0.48 (0.36–0.62)	0.41 (0.30–0.55)
IMD quintile 5 vs 1	2.66 (2.42–2.93)	1.47 (1.33–1.63)
CCI ≥ 3 vs 0	2.25 (1.99–2.53)	1.46 (1.33–1.61)
Recent DKA ≤ 28 d	11.4 (10.1–12.8)	108.7 (88.5–133.5)

All associations shown were statistically significant at $P < 0.001$ (quasi-Poisson model, adjusted for age, sex, and ethnicity)



Who is at Risk for DKA

Risk for DKA



Populations at risk

- With history of DKA
- Those with suboptimal glycemia
- Adolescents and young adults
- Individuals with disordered eating
- Using insulin pumps or automated insulin delivery (AID) systems
- No advanced diabetes technology use
- Using sodium-glucose cotransporter 2 inhibitors (SGLT2) therapies

Ketosis-prone T2D

- Black or Latino descent
- Male
- Middle aged
- Overweight or obesity
- Family history of diabetes
- Newly diagnosed diabetes

Independent of history of diabetes

- Excess alcohol intake
- Pregnancy

Ketone presence = states of absolute or relative insulin insufficiency

AID, automated insulin delivery; DKA, diabetic ketoacidosis; SGLT2, sodium-glucose co-transporter 2; T2D, type 2 diabetes
Nguyen KT, et al. *J Diabetes Sci Technol*. 2022; Westerberg DP. *Am Fam Physician*. 2013; Kitabchi AE, et al. *Diabetes Care*. 2009; Benoit SR, et al. *Diabetes Care*. 2020.

New Data: Risk Factors for DKA



Prevalence: Studies show T2DM makes up a significant minority of DKA cases, with some reports citing it as high as 82.9% in specific high-risk, under-resourced populations.

Incidence Rates: In older adults (60-90 years), the incidence is roughly 5-7 per 100,000 person-years.

Ketosis-Prone Type 2 (KPD): A specific subset of Type 2 patients is prone to ketosis, which can cause DKA. Or those misdiagnosed and are Type 1 (Single or Multiple antibody positive)

Precipitating Factors: Common causes include infection (especially COVID-19), missing medication or insulin doses, and use of SGLT2 inhibitors.

Rising Incidence: Data from the CDC indicates that DKA hospitalizations, including those in T2DM, have increased over time, potentially due to factors like COVID-19 or SGLT2 inhibitor use

Wysham C, et al. *Diabetes*. 2026.



Current Outpatient Assessment of DKA

Current Outpatient Monitoring



	Blood Capillary Meter	Urinary Analysis
What does it measure?	β -hydroxybutyrate	Acetoacetate
Method of measuring	Discrete values	Colorimetric test
Cost	Expensive	Relatively affordable

Nguyen KT, et al. *J Diabetes Sci Technol*. 2022.

Current Diagnostic Thresholds for DKA



DKA	Diabetes/hyperglycemia	Glucose ≥ 200 mg/dl (11.1 mmol/l) or prior history of diabetes
	Ketosis	β -hydroxybutyrate ≥ 3.0 mmol/l or urine ketone strip 2+ or greater
	Metabolic Acidosis	pH < 7.3 and/or bicarbonate concentration < 18 mmol/l

Umpierrez GE, et al. *Diabetes Care*. 2024.

Opportunities to Improve Current Ketone Monitoring



Patient Challenges	Clinical Challenges	Healthcare System Challenges
Low rates of ketone self testing	Intermittent (episodic) testing	Variable implementation of ketone monitoring recommendations
Uncertainty about when to test	Often initiated after symptoms develop	Gaps in patient and clinician education
Uncertainty about how to respond	Limited ability to detect evolving metabolic deterioration	Predominantly reactive approach to DKA prevention

Current ketone monitoring remains an important component of DKA prevention, but practical limitations create opportunities for innovation.

Dhatariya K, et al. *Lancet Diab Endocrinol*. 2026; Albanese-O'Neil A, et al. *Diabetes Care*. 2017.



Why CKM is Needed over Current Assessment Strategies

Continuous Ketone Monitoring (CKM) Can Detect DKA Earlier Than Standard Care



- Objective: assess the feasibility of CKM during DKA and the agreement between interstitial and venous beta-hydroxybutyrate (BOHB)
- **CKM values were strongly correlated with venous BOHB ($r = 0.96$, $p < 0.001$).**
- **DKA resolution was detected 55 min earlier (mean, 95% CI 26–84, $p = 0.001$) via CKM than standard care.**
- No device-related complications occurred, and CKM application and removal were well tolerated by all patients.
- Demonstrates feasibility of continuous ketone monitoring during DKA treatment
- **Conclusion: CKM demonstrated clinically accurate ketone measurement and earlier recognition of DKA resolution**

Haas NL, et al. *Diabetes Technol Ther.* 2026.

Emerging Evidence Supporting Continuous Ketone Monitoring

Physiologic Insights

- Ketones may rise before marked hyperglycemia
- Strong concordance between CKM and venous beta hydroxybutyrate
- Supports earlier identification of metabolic deterioration

Liu P, et al. *Diabetes Technol Ther.* 2026.

Patient Perspectives

- 82% interested in dual glucose ketone monitoring
- Major barriers:
 - Symptom recognition
 - Equipment access
 - Time
- Highlights limitations of current monitoring

Cosson E, et al. *Diabetes Technol Ther.* 2026.

Emerging evidence supports both the physiologic rationale and strong patient interest in continuous ketone monitoring.

The Clinical Benefits of CKM



Beta-Hydroxybutyrate Detection



Primary ketone in DKA
Measured by CKM via the
interstitial fluid of subcutaneous
tissue

Early Detection of Ketone Changes



CKM detects rising ketones earlier
than urine tests, helping prevent
life-threatening DKA

Versatile Across Care Settings



Useful for diabetes management in
both inpatient and outpatient
settings



Ketone testing is limited by access and delays
CKM offers a +real-time, proactive solution

Continuous ketone monitoring has the potential to shift DKA management from
reactive detection toward proactive prevention.



What do we have now?

The Future is Now



Now that we have Dual Sensing Technology-

Let's Revisit the International Expert Recommendations on the Application of New Technology...

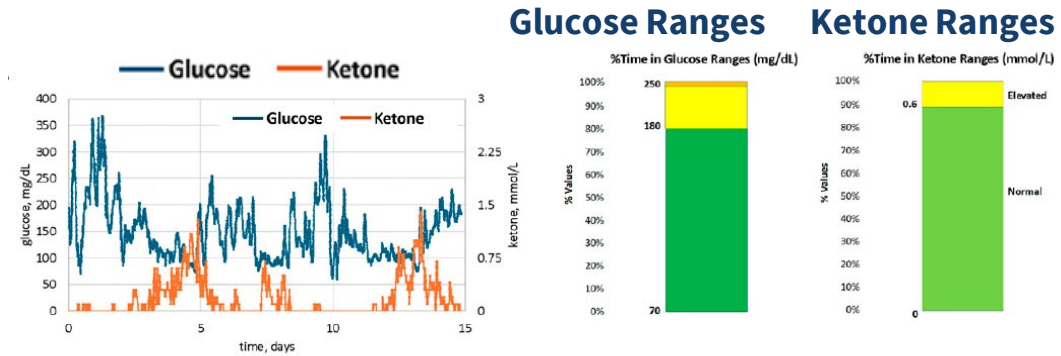
Confirmation of Recommendations or Any Changes to Suggested Use?

BeyondType1.org; Dhatariya K, et al. *Lancet Diab Endocrinol*. 2026.

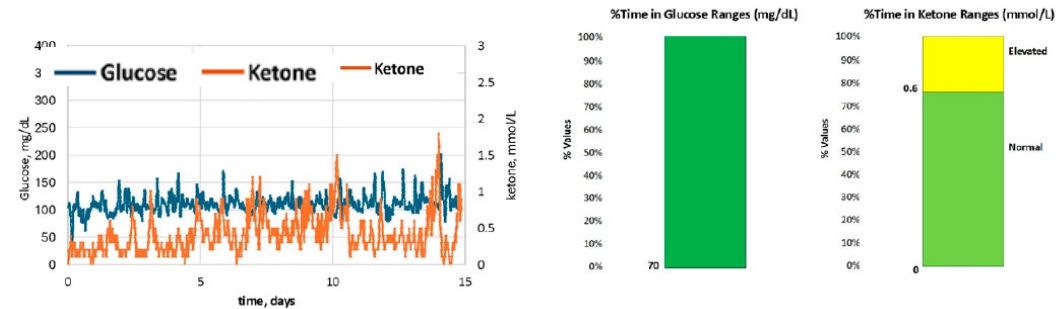
How Can Dual Monitoring Impact Practice: Case Studies from the Real World



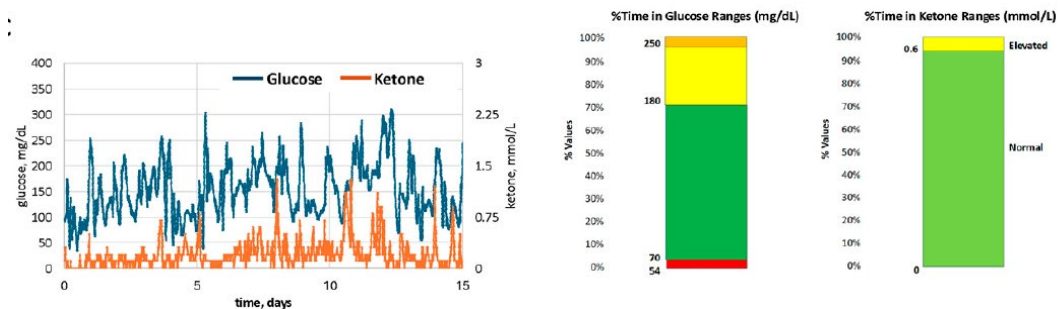
A 62-year-old woman with T2D and stage 3 **CKD**



A 59-year-old man with T2D treated with **SGLT2 inhibitor**



A 73-year-old woman with T1D using an **AID system**



Bergenstal RM, et al. *Diabetes Technol Ther.* 2025.

Interprofessional Team Overview in DKA Care



Nurse coordinators	Social workers	Psychologists	Pharmacists
Advanced practice providers	Dietitians	School nurses	Diabetes care and education specialists





Reflect on What You Have Learned

How will you apply what you have learned to your practice and with your interprofessional and interdisciplinary diabetes care team?