Development and Implementation of an Evidence-based Diabetic Ketoacidosis (DKA) protocol in the Intensive Care Unit (ICU): A Pilot project

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Introduction

- In the U.S. over 50 adults per 1000 are readmitted with DKA each year, costing over 2 billion dollars.[2]
- A consistent evidenced-based protocol involving consistent treatment guidelines and including patient education has been shown to decrease DKA readmissions.
- GRMC had a 40.5% readmission rate for DKA patients in 2019.
- GRMC DKA protocol lacked consistent treatment in ICU and patient education.
- Provider preference for management of DKA led to inconsistencies and delays and were not evidenced based.
- The aim of this project was to develop and implement an evidenced based ICU protocol to improve DKA treatment and that included patient education.

Purpose

The purpose of this project is to implement an evidence-based practice intervention in GRMC's ICU standardizing DKA treatment protocols, aiming to improve patient education & reduce 90-day readmissions. [1]

Methods

IRB deemed this project not human subject research

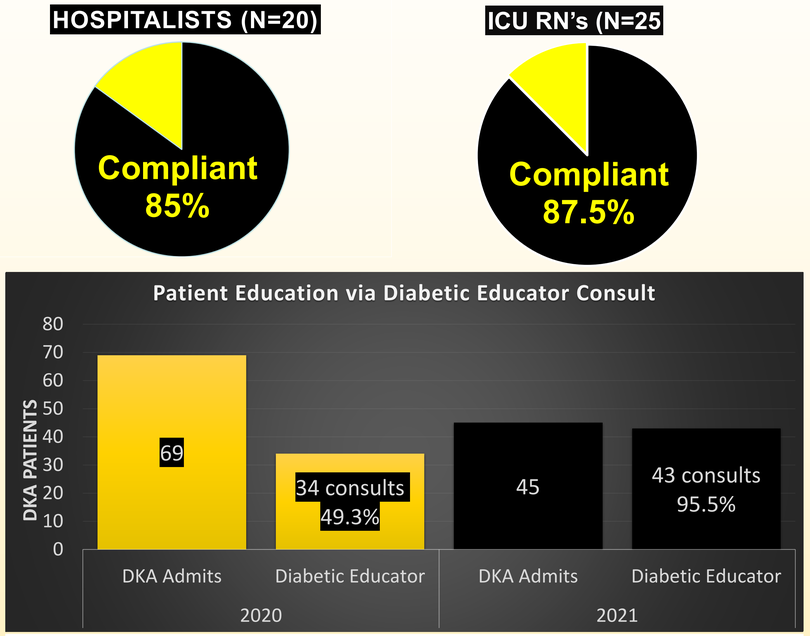
Setting: GRMC–ICU

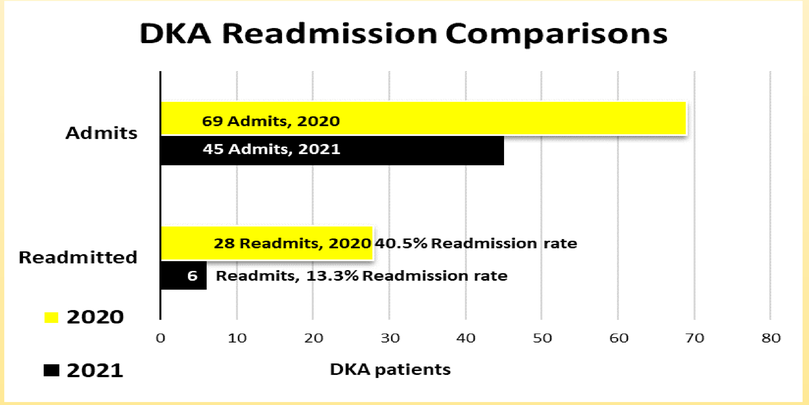
Population: DKA patients ≥ age 18

Timeline: June 1st, 2021 – November 1st, 2021

- DKA algorithm was created by combining evidence-based DKA protocol was developed by the project director after reviewing current literature.[1,3,6,7]
- Pilot DKA protocol was presented to GRMC executive board, hospitalist and ICU nursing staff and received consensus and was approved for implementation.
- Training was completed for physicians & nursing staff prior to pilot project implementation.
- Chart audits monitored staff compliance & patient education
- GRMC IT provided data on DKA admissions prior to project start and after completion to monitor DKA readmissions.
- Staff surveys identified barriers & suggested updates were implemented resulting in improved compliance.
- Monthly surveys were sent out monitoring staff compliance and understanding.
- Objective #1: 75% providers will implement & comply with EBP DKA algorithm.[4]
- Objective #2: 95% ICU nurses will implement & comply with EBP DKA algorithm.[4]
- Objective #3: 25% reduction in 90-day DKA readmissions.[1]
- Objective #4: 90% DKA patients receive education before discharge.[1]

Outcomes





Evaluation

- **Objective #1:** 85% provider compliance
- **Objective #2:** 87.5% ICU nurse compliance
  - EMR issues contributed to lack of compliance.
- **Objective #3:** 27.2% readmission reduction achieved utilizing DKA education.
  - Chi square test $P < 0.001$.
- **Objective #4:** 95.5% patients received education by DKA education specialist due to inclusion of Diabetic educator consult in pilot protocol.

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Conclusions

- Advanced Practice Nurse led evidenced based quality improvement projects can lead to practice change.[4]
- **Impacts** of project implementation:
  - Achieved > 80% compliance implementing a DKA evidence-based protocol during a hospital merger & global pandemic, evidenced by provider & nursing compliance rates.
  - Patient education utilizing Diabetic educator team resulted in 27.2% reduction of DKA patient readmissions.
- **Challenges**:
  - Communication was challenging, requiring the project director to individually question staff to evaluate DKA pilot protocol implementation issues, however, communication promoted team building practices.[4]
  - Staff misunderstanding implementing DKA pilot protocol was addressed thru interviews & surveys collected.
  - This protocol was the 1st protocol approved at GRMC allowing ICU nurses to independently initiate & administer electrolyte replacement and IV fluid changes based on patients' labs & hourly BGM's underscoring the future of nursing report to expand nursing to its full scope of practice.[2]
  - Continued education on this new practice is needed for ICU nurses & providers.
- **Dissemination**:
  - Monthly and PRN face to face staff communication during project supported buy-in.[4]
  - Staff surveys identified barriers; suggested updates were implemented resulting in improved compliance.
  - Incorporating staff & diabetic educator patient education for every DKA admission resulted in a significant decrease in 90-day DKA readmissions.
  - Poster presentation at a GRMC lunch and learn.
- **Sustainability**:
  - IT staff created electronic nursing pop-ups that coordinate with lab monitoring as reminders for electrolyte replacements attached to the DKA orders.[6]
  - Pharmacy will send monthly emails reporting DKA protocol use.[4]
  - ICU nursing supervisor and pharmacists will continue to monitor usage and implementation issues to improve compliance & reduce the CMS quality 90-day readmission indicators for DKA patients.[4]

References

1. American Diabetes Association. (2019). Diabetes Care in the Hospital: Standards of Medical Care in Diabetes-2019. Diabetes Care, 42(1) Retrieved from https://doi.org/10.2337/dc19-S015
2. Farsani, et. al (2017). Incidence and prevalence of diabetic ketoacidosis (DKA) among adults with type 1 diabetes mellitus: a systematic review. *BMJ Open*, 7(7). Doi:10.1136/bmjopen-2017-016587
3.. Gupta, D., Kirn, M., Jamkhana, Z. A., Lee, R., Albert, S. G., & Rollins, K. M. (2017). A unified Hyperglycemia and Diabetic ketoacidosis (DKA) insulin infusion protocol based on an Excel algorithm and implemented via Electronic Medical Record (EMR) in Intensive Care Units. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 11(4), 265-271. doi:10.1016/j.dsx.2016.09.008
4. Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. Worldviews on Evidence-Based Nursing, 14(3). doi:10.1111/wvn.12223
5. Kitabchi, A., Umpierrez, G., Miles, J., & Fisher, J. (2009). Hyperglycemic Crises in Adult Patients With Diabetes. Diabetes Care, 32(7). Retrieved from https://doi.org/10.2337/dc09-9032
6. Maynard, G. A., Holdych, J., Kendall, H., Harrison, K., Montgomery, P. A., & Kulasa, K. (2017). IMPROVING GLYCEMIC CONTROL SAFELY IN CRITICAL CARE PATIENTS: A COLLABORATIVE SYSTEMS APPROACH IN NINE HOSPITALS. Endocrine Practice, 23(5), 583-593. doi:10.4158/ep161569
7. Younis, M., Pham, J., Asad, H., Hamarshi, M. (2020). Computer-Based versus Paper-Based Insulin Infusion Algorithms in Diabetic Ketoacidosis. Current Diabetes Reports, 16(6). doi: 10.2174/1573399815666190712191932