**Name of journal:** World Journal of Diabetes

**Manuscript NO:** 46368

**Manuscript Type:** EDITORIAL

**Do we need to screen every patient in intensive care unit for diabetes in community with high prevalence of diabetes?**

Dutt T *et al*. Diabetic screening in ICU

Taru Dutt, Rahul Kashyap, Salim Surani

**Taru Dutt,** Department of Neurology Research, Mayo Clinic, Rochester, MN 55902, United States

**Rahul Kashyap,** Department of Anesthesiology and Peri-operative Medicine, Critical Care IMP, Mayo Clinic, Rochester, MN 55902, United States

**Salim Surani,** Health Science Center, Texas A and M University, Corpus Christi, TX 78404, United States

**ORCID number:** Taru Dutt (0000-0003-1705-3558); Rahul Kashyap (0000-0002-4383-3411); Salim Surani (0000-0001-7105-4266).

**Author contributions:** Dutt T, Kashyap R and Surani S contributed to the content writing of the manuscript. Final manuscript draft was approved by all the authors.

**Conflict-of-interest statement:** The authors have no conflict of interest to declare.

**Open-Access:** This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

**Manuscript source:** Invited manuscript

**Corresponding author: Salim Surani, BSc, FACC, FACP, FCCP, MD, Adjunct Professor,** Health Science Center, Texas A and M University, 701 Ayers Street, Corpus Christi, TX 78404, United States. srsurani@hotmail.com

**Telephone:** +1-361-8857722

**Fax:** +1-361-8507563

**Received:** February 9, 2019

**Peer-review started:** February 10, 2019

**First decision:** February 19, 2019

**Revised:** February 27, 2019

**Accepted:** March 8, 2019

**Article in press:** March 8, 2019

**Published online:** March 15, 2019

**Abstract**

Diabetes mellitus (DM) is marked as global health care challenge with almost 10% of the United States population being diagnosed with DM. A sizeable percentage of patients are oblivious of their disease, in spite of easily accessibility knowledge about its early signs and symptoms and rapid diagnostic modalities. Critically ill patients with undiagnosed DM are likely to have an increased mortality as compared to intensive care unit (ICU) patients with diagnosed DM. DM may have adverse effect on ICU patients causing organ failure and complications. Early Screening of patients at the risk of developing disease may prevent long term complications. Early screening and management may be beneficial as controlled DM patients have similar morbidity as non DM patients in ICU. An intense glycaemic and blood pressure control improves retinopathy and albuminuria, but may not affect the macrovascular outcomes.

**Key words:** Diabetes mellitus; Intensive care unit; Microvascular; Macrovascular; Diabetes screening

**© The Author(s) 2019.** Published by Baishideng Publishing Group Inc. All rights reserved.

**Core tip:** Undiagnosed diabetes mellitus (DM) predisposes critically ill patients to DM complications, which may affect their morbidity and mortality during intensive care unit stay.

**Citation:** Dutt T, Kashyap R, Surani S. Do we need to screen every patient in intensive care unit for diabetes in community with high prevalence of diabetes? *World J Diabetes* 2019; 10(3): 137-139

**URL:** https://www.wjgnet.com/1948-9358/full/v10/i3/137.htm

**DOI:** https://dx.doi.org/10.4239/wjd.v10.i3.137

**INTRODUCTION**

An estimated 30.3 million people of all ages, or 9.4% of the United States population had diabetes mellitus (DM) in 2015. This included 30.2 million adults aged 18 years or older (12.2% of all United States adults), of which 7.2 million (23.8%) were unaware of or did not report having DM. The percentage of adults with DM increased with age, reaching a high of 25.2% among those aged 65 years or older[1]. In spite of the wide accessibility of knowledge about the early signs and symptoms of DM and ease of diagnostic modalities, many patients are oblivious of their disease[2]. Worldwide approximately 193 million diabetic patients remain undiagnosed predisposing them to the development of several long-term complications of untreated chronic hyperglycaemia, making this a global health care challenge[3].

**PREVALENCE OF DM IN AMONG CRITICALLY ILL PATIENTS**

The complications of DM include both microvascular and macrovascular pathologies and comprise of retinopathy, neuropathy, renal failure, cardiovascular complications and increased risk of death. A study conducted by Tancredi *et al*[4] concluded that there is 15 fold increases on all-cause mortality in patients with Type-2 DM. These complications have profound physical as well as psychological burden on the patient, the family, and the care givers and on a larger scale they affect the health of the society.

On the other hand, intensive care unit (ICU) admissions with undiagnosed DM have been showing a steady increase in the past few years[2]. Carpenter *et al*[2] studies the impact of undiagnosed DM in 9 ICU’s. The study reported that patients with undiagnosed DM had an increased mortality as compared to ICU patients with diagnosed DM; and also showed increased trend for higher average blood glucose level and insulin infusion. Thus need for DM screening amongst critically ill patients is paramount.

**BENEFIT OF DM SCREENING**

A study conducted by Kunthi *et al*[5] suggested that screening of subpopulations using risk scores can rule in high risk patients and the diagnosis can be confirmed by measurements of fasting plasma glucose or HbA1c concentrations or tests for oral glucose tolerance. Screening of the individuals who are at the risk of developing disease will prevent the long term microvascular as well as macrovascular complications. Early detection also helps in optimal disease management by practicing lifestyle modifications such as weight reduction, quitting smoking and alcohol, increased physical activity and healthy diet[6]. However, various methods of screening may have used in the different studies including risk score, fasting plasma glucose, HbA1c concentrations or tests for oral glucose tolerance. This questions the applicability of a universal operational definition for DM diagnosis.

**CONTROVERSIES AND COST EFFECTIVENESS OF DM SCREENING**

Alongside, the various large multicentre studies concluded that macrovascular complications do not show any significant change[7]. The risk of cardiovascular disease and other macrovascular complications does not improve with intensive management of the screened population; hence the application of universal screening method is not promoted[7].The UKPDS researchers[8] showed that despite an intense glycaemic and blood pressure control macrovascular outcomes were not improved but there was a significant improvement in retinopathy and albuminuria. Krinsley *et al*[9] have shown that hyper-glycemia not only affects the morbidity in critically ill patients but also the patients admitted to the general medicine wards. They noted that high glucose variability (CV > 20%) increased mortality in non DM patients in both ICU as well as the floor settings but for the DM patients it was restricted only for ICU. Patients with DM having low HbA1c levels and patients without DM have equal mortality and morbidity risks and hyperglycaemia increases mortality. Siegelaar *et al*[10], in their meta-analysis showed that the diabetic patients have higher chances of developing complications like sepsis or organ failure and these in turn have increased mortality rate compared to non-diabetic population. However, Diabetes does not serve as an independent factor for ICU mortality and after acquiring complications the morality rate would be same in diabetic as well as non-diabetic patients[10].

**CONCLUSION**

DespiteDM being widely prevalent in United States, still substantial numbers of patients in older age are undiagnosed. This predisposes them to micro and macrovascular complications, which in turn may affect their morbidity and mortality during ICU stay. Universal screening of DM has been proved beneficial to prevent microvascular compilations but not much difference is seen in the macrovascular maladies. Early screening and management may be beneficial as controlled DM patients have similar morbidity as non DM patients in ICU. DM may be associated with increased mortality in ICU patients. However, how DM intrinsically affects the ICU mortality, is still open for discussion.

**REFERENCES**

1 **Centers for Disease Control and Prevention.** National Diabetes Statistics Report, 2017; 1-20. Available from: URL: https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

2 **Carpenter DL**, Gregg SR, Xu K, Buchman TG, Coopersmith CM. Prevalence and Impact of Unknown Diabetes in the ICU. *Crit Care Med* 2015; **43**: e541-e550 [PMID: 26465219 DOI: 10.1097/CCM.0000000000001353]

3 **Cho NH**, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, Malanda B. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Res Clin Pract* 2018; **138**: 271-281 [PMID: 29496507 DOI: 10.1016/j.diabres.2018.02.023]

4 **Tancredi M**, Rosengren A, Svensson AM, Kosiborod M, Pivodic A, Gudbjörnsdottir S, Wedel H, Clements M, Dahlqvist S, Lind M. Excess Mortality among Persons with Type 2 Diabetes. *N Engl J Med* 2015; **373**: 1720-1732 [PMID: 26510021 DOI: 10.1056/NEJMoa1504347]

5 **Khunti K**, Chatterjee S, Carey M, Daly H, Batista-Ferrer H, Davies MJ. New drug treatments versus structured education programmes for type 2 diabetes: comparing cost-effectiveness. *Lancet Diabetes Endocrinol* 2016; **4**: 557-559 [PMID: 27235133 DOI: 10.1016/S2213-8587(16)30048-1]

6 **Chatterjee S**, Khunti K, Davies MJ. Type 2 diabetes. *Lancet* 2017; **389**: 2239-2251 [PMID: 28190580 DOI: 10.1016/S0140-6736(17)30058-2]

7 **Simmons RK**, Griffin SJ, Lauritzen T, Sandbæk A. Effect of screening for type 2 diabetes on risk of cardiovascular disease and mortality: a controlled trial among 139,075 individuals diagnosed with diabetes in Denmark between 2001 and 2009. *Diabetologia* 2017; **60**: 2192-2199 [PMID: 28831539 DOI: 10.1007/s00125-017-4299-y]

8 **King P**, Peacock I, Donnelly R. The UK prospective diabetes study (UKPDS): clinical and therapeutic implications for type 2 diabetes. *Br J Clin Pharmacol* 1999; **48**: 643-648 [PMID: 10594464]

9 **Krinsley JS**, Maurer P, Holewinski S, Hayes R, McComsey D, Umpierrez GE, Nasraway SA. Glucose Control, Diabetes Status, and Mortality in Critically Ill Patients: The Continuum From Intensive Care Unit Admission to Hospital Discharge. *Mayo Clin Proc* 2017; **92**: 1019-1029 [PMID: 28645517 DOI: 10.1016/j.mayocp.2017.04.015]

10 **Siegelaar SE**, Hickmann M, Hoekstra JB, Holleman F, DeVries JH. The effect of diabetes on mortality in critically ill patients: a systematic review and meta-analysis. *Crit Care* 2011; **15**: R205 [PMID: 21914173 DOI: 10.1186/cc10440]

**P-Reviewer:** Su G, Brunetti A **S-Editor:** Dou Y **L-Editor:** A **E-Editor:** Wu YXJ

**Specialty type:** Endocrinology and metabolism

**Country of origin:** United States

**Peer-review report classification**

Grade A (Excellent): 0

Grade B (Very good): B

Grade C (Good): C

Grade D (Fair): 0

Grade E (Poor): 0