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EDITORIAL

Diabetic ketoacidosis: Looking through the lens of healthcare systems

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SUMMARY

Diabetic ketoacidosis (DKA) provides a lens on the entire healthcare system. Presentations often indicate a preventable complication of a chronic health condition, typically triggered by noncompliance with therapy, and usually affect younger individuals, often from socially disadvantaged backgrounds. DKA may reflect gaps in access to and appropriate engagement with primary care and specialist endocrinology programs in communities. DKA is easily diagnosed, evident almost exclusively when patients present to the hospital; it is associated with metabolic derangements severe enough to sometimes, but not always, require critical care resources. This editorial provides insights into the efficiency with which healthcare resources are used for DKA.

Key Words: Diabetic ketoacidosis; diabetes-related complication; intensive care unit; socioeconomic determinants of health

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INTRODUCTION

Athar et al. present data on admissions to the intensive care unit (ICU) due to diabetic ketoacidosis (DKA) at a hospital in Melbourne, Victoria, Australia[1] that have sobering implications for healthcare resource allocation, including primary care, specialist access, and hospital management of diabetes patients in their catchment.

Diabetes is a chronic health condition, with prevalence in Australia increasing steadily from 3.3 per cent in 2001 to 5.3 per cent in 2022. Diabetes is the seventh leading cause of death in Australia, responsible for 6,050 deaths in 2022.[2] Type 2 diabetes alone was the twelfth leading contributor (4.8 per cent) of Australia's total disease burden.[2] There is strong association between social determinants of health and disproportionate population health burden in terms of prevalence and economic costs from diabetes.[3] Australian Bureau of Statistics (ABS) data suggest diabetes in Australia is most prevalent in people born overseas, living in areas of socioeconomic disadvantage, not in the labour force, and with completion of school Year 10 or below as their highest educational qualification.[2]

Some suburbs in Victoria have a disproportionately high number of residents who were born overseas or are offspring of first-generation immigrants. According to 2021 census data, 30.6 per cent of the population in one suburb was not in the labour force, and 27.6 per cent reported completion of school Year 10 or below as their highest educational qualification. Not surprisingly, 2021 Census data also report a higher prevalence of diabetes than reported for either Victoria or for Australia overall in this catchment.[4]

Diabetic ketoacidosis (DKA) is a life-threatening but avoidable complication of diabetes with high rates of occurrence in persons under age 45 years[5], contrary to the overall population prevalence of diabetes. This is reflected in the cohort studied by Athar et al.[1]

Given almost all patients in the same cohort had poor long-term glycaemic control, evidenced by elevated HbA1c (>7.0%)—a significant risk factor for cardiovascular disease and stroke in patients with diabetes[6] and a prognostic marker for morbidity and mortality in critically ill patients[7]—there are alarming implications for additional healthcare needs in this catchment in the future.

Non-compliance with treatment was the most common precipitant for DKA and may reflect lack of easy affordable access to and engagement with primary and specialist care in this catchment for diabetes management. Non-compliance is a major contributor to the economic burden from DKA. Not only was non-compliance associated with severe DKA presentations, more than a quarter of presentations in this series were recurrences, representing higher mortality risk and fragmentation of care.[8] This may reflect lack of availability of protocolised inpatient diabetes education and referrals to structured outpatient diabetes education, with particular focus on first and repeat DKA presenters—strategies proven to reduce HbA1c levels.[9]

The strong association between patients who were previously undiagnosed or awaiting completion of diabetes workup presenting to the emergency department (ED) in severe DKA also underlines the importance of access to primary and specialist care to obtain early diagnoses.

The Athar et al. study has important implications for availability and use of limited critical care resources in this health catchment. While risk-adjusted mortality rates from DKA in Australia have remained stable over recent decades, the incidence of ICU admissions due to DKA have demonstrated a fivefold increase between 2000 and 2013, with metropolitan and rural ICUs in Australia and New Zealand facing the brunt of the increasing burden of DKA, while ICU usage has actually decreased in tertiary centres.[10]

DKA has been used previously as an index of ICU admission practices.[11] It is an easily diagnosed condition that is almost exclusively present on hospital admission—rather than developing during hospitalization—and for which ICU admission is common but not essential. Overseas data suggest increased ICU admission for DKA occurs in areas with high socioeconomic status and in centres where there is high ICU use for non-DKA causes, while there are fewer admissions to ICU in centres with high numbers of DKA presentations.[11]

The Athar et al. study was conducted in a metropolitan hospital ICU in an area of socioeconomic disadvantage with high prevalence of diabetes.[1] The majority of patients presenting with DKA to the hospital in this study were admitted to ICU, despite having mostly moderate-mild severity at presentation. This likely reflects generally high ICU usage for both DKA and non-DKA patients, raising concerns about the capabilities of inpatient services outside ICU. Despite acknowledgement of exit block—defined as the inability to discharge a patient from the ICU who is otherwise medically fit to leave, due to no available ward beds and limited clinical or ancillary staffing levels in the wards[12]—ICU length of stay (LOS) is

comparable to published Australian data, but the overall hospital LOS is not. The similarities in the post-ICU ward LOS (in the ICU cohort) and hospital LOS (in the non-ICU cohort) raise questions about access to and efficiency of inpatient diabetes care. Other external factors such as limited outpatient access to endocrine specialists and limited engagement with primary care may also contribute not just to prolonged LOS but also to poorer management in the community, exacerbating the frequency and severity of DKA presentations.

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