

## Editorial

# Type 1 diabetes in limited resource settings: Where are we and where do we need to go?

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*“If access to health care is considered a human right, who is considered human enough to have that right?” – Professor Paul Farmer*

Globally, more than 8 million people live with type 1 diabetes (T1D), with India having the second highest prevalence.<sup>[1]</sup> In 2021, nearly one-fourth of the world's mortality due to T1D was in South Asia. As per the just released T1D index,<sup>[1]</sup> the remaining life expectancy of a 10-year-old child newly diagnosed with T1D is projected to be 24 years in India and 12 years in Ethiopia compared to 57 years in the USA and 64 years in Australia. Moreover, almost two-thirds of the deaths in young people with T1D are estimated to be due to non-diagnosis. Many of these numbers are extrapolations due to the non-availability of data in low-income countries and low-middle-income countries. This situation is appalling and unacceptable. Two things come out of this. First, campaigning for increasing awareness of T1D is the need of the hour. Second, registries provide valuable insights and creating them must be given importance.

Not surprisingly, diabetic ketoacidosis (DKA) is more frequent in limited resource settings (LRS). Even if DKA is timely diagnosed, access to healthcare facilities and trained healthcare personnel (HCP) may be suboptimal. Equipment and practices for safe intravenous (IV) fluid and IV insulin (IVI) may be scarce. It may not be possible to quickly shift to a referral center (sick child, no finances, difficult transport, due to long distance, civil or political unrest, floods, and pandemics to name a few).

Few studies successfully describe use of subcutaneous insulin (SCI) (mostly analogs) in DKA (mostly uncomplicated mild to moderate), which were used as evidence base in the ISPAD guidance for SC insulin in DKA.<sup>[2]</sup> Analogs may not be universally available. Regular (R) and/or pre-mixed insulin are frequently the only insulin available in LRS public hospitals.<sup>[3]</sup>

The article by Ayyavoo *et al.*<sup>[4]</sup> in this issue adds valuable information regarding the use of R insulin as a SCI in severe DKA.

With telemedicine, it may take just a phone call to connect with an expert to start appropriate fluids and insulin in DKA. With the less complicated nature of management with SCI, the peripheral HCP may not hesitate to initiate treatment, as against IVI. Cost-effectiveness<sup>[4,5]</sup> and practicability of treatment in wards (and not ICUs) are alluring.

Hypoglycemia and hypokalemia have been associated with poorer outcomes in DKA in LRS.<sup>[6]</sup> Clinical and biochemical monitoring, especially for electrolytes and blood glucose

(BG), and robust protocols for potassium supplementation remain crucial.<sup>[7]</sup> The cost and availability of BG test strips are more challenging than those of insulin. A suggestion, when BG test strips are insufficient while treating DKA, is to do less frequent testing (maybe every 3–4 h) during the initial DKA management when BG is expected to be high, to save strips for later when the likelihood of hypoglycemia is higher (Virmani *et al.* management of children and adolescents with diabetes in limited resource settings, unpublished).

Understandably, there are limitations in the study by Ayyavoo *et al.*<sup>[4]</sup> because of the retrospective nature of study and data analysis. The authors themselves may have been a little unsure of outcomes initially, and SC insulin in the ward for their children with DKA may have been the only option. The resources available to record data may have been limited. However, their observations lead the way to plan future prospective studies with defined endpoints which will provide hard “evidence.” Where available, IVI remains the standard of care for the management of DKA.<sup>[7]</sup>

Following resolution of DKA, comprehensive management for optimal glycemia is equally important.

All is not doom and gloom. LRSs are often characterized by resilience and ability to adapt. Remote regions now have access to web connectivity and information. Prices of conventional and biosimilar insulin and BG test strips are coming down consistently, especially in countries like India, due to increased manufacturing capacity and competitive pricing strategies. Organizations such as ISPAD and ISPAE are constantly working toward greater awareness among all stakeholders. Online pediatric diabetes education programs by ISPAE have been successful and popular.<sup>[8]</sup>

A lot more remains to be done. Campaigns to increase T1D awareness among the general public and HCPs remain foremost. Training of allied HCPs apart from doctors, 24 h helpline, may be as a hub and spoke model; interactive step-by-step flowcharts for the management of DKA as posters or electronic sources in primary health centers for easy reference could be some. T1D registries in LRS need to be created. Governments are key stakeholders in providing structured national health policies for T1D<sup>[9]</sup> and ensuring diabetes care supplies, in consultation with HCPs and importantly, persons with T1D who surely deserve to live happy and healthy with productive lives.

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