

# Diabetes Technology Update: Practical Information for Clinicians

## Preface

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Some would argue that the introduction of self-monitoring of blood glucose (SMBG) in the late 1970s marked the introduction of “diabetes technology.” However, I would take issue with that. The real introduction came with the first use of insulin in the 1920s. Patients were often instructed to use cumbersome tests to measure glycosuria, and insulin adjustments were attempted based on this very crude data.

Elliot Joslin should be considered the father of diabetes technology. After all, he was the physician who realized the power of home-based data to make changes in diabetes therapy. He also appreciated how helpful it would be if there was a possibility for home *blood* glucose testing, because he realized the limitations of testing for urine glycosuria. In the seventh edition of his manual, published in 1941, he lamented, “Unfortunately, no method is available which is simple enough for patients or indeed most physicians to employ. . . . individual tests are expensive, because it is almost as easy to do ten tests as one.”<sup>1</sup>

So, even in the early days of insulin therapy, costs for diabetes monitoring were a concern. But Joslin had strategies to reduce costs, too. For example, he noted that “a ‘girl’ doctor from Florida told me there were bargain blood sugar days in her city on which patients could receive a 60% reduction.” He concluded that “blood sugar tests are extremely useful in treatment. Secure more of them.”<sup>1</sup>

As on so many other topics in diabetes management, Joslin was ahead of his time. He appreciated even in the early days of insulin therapy how powerful frequent blood glucose test-

ing could be to assist patients in their daily home management. I don’t believe even Joslin could have predicted the wide use of SMBG, even in patients not receiving insulin, let alone real-time continuous glucose monitoring (CGM). Considering that Joslin practiced in the pre-computer era, it is interesting to consider what his reaction would be in a typical modern diabetes clinic with enough downloading cables next to the computer to confuse the brightest geek. (We’d have to explain that word to him.)

But it certainly is true: diabetes and technology have progressed quickly during the past decade. There are many reasons for this: better, faster, and smaller blood glucose meters and computers; the global use of the Internet; wide acceptance of insulin pump therapy; the introduction of glucose sensors; and, of course, competition among companies to be industry leaders in this area.

Diabetes technology is a timely topic. There are two American diabetes technology conferences each year, and I just returned from the first diabetes technology conference in Europe. There are two journals devoted to diabetes technology, and the vast majority of my patients and certainly many providers are most interested in what is the “latest and greatest” in the world of diabetes technology. A PubMed search of “diabetes” and “technology” yielded 2,122 articles.

For these reasons, I’m delighted to present this *Diabetes Spectrum* From Research to Practice special section devoted to technology. As you read through it, you will find information on all aspects of this topic by experts in this field, and I’m sure you will

enjoy reading these articles as much as I did.

However, I feel we must continue to remind ourselves that improvements in our technology do not necessarily always bring improvements in outcomes. Our new tools by themselves may not always result in an improvement of hemoglobin A<sub>1c</sub> (A1C), a reduction of hypoglycemia, or a reduction in lower-extremity amputations, end-stage renal disease, or blindness from diabetic retinopathy. Unfortunately, the technology in of itself is not sufficient to improve these outcomes because the burden of self-care remains with patients.

This should not be a surprise to any long-term health care provider. With the beginning of SMBG (and even now!), we saw patients who never took their meter out of their bathroom drawer. Or we have had patients purchase real-time CGM systems but decide not to wear them for a variety of reasons. And how many patients have we seen over the years wearing an insulin pump with

an A1C > 9%? Indeed, technology needs to be appreciated and used appropriately with limitations understood by both providers and patients because, by themselves, these new tools are not enough.

Let's face it: our only expectation for all of this new technology is to improve diabetes control and quality-of-life for those patients who are best able to use the new equipment. Ideally, this means that both providers and patients must have a good understanding of the uses and limitations of the technology, whatever they may be. In my experience, those who struggle the most with or without these new tools are those with some type of psychosocial problems, especially depression. It would be inappropriate to think a new pump or sensor will bring about dramatic long-term improvements for someone with major depression, without first treating the psychiatric disorder.

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## References

<sup>1</sup>Joslin EP: Chapter XXVII: Selected laboratory tests useful for diabetic management. In *A Diabetic Manual for the Mutual Use of Doctor and Patient*. 7th ed. Philadelphia, Pa., Lea & Febiger, 1941, p. 221–228

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