Evolution of Diabetes Insulin Delivery Devices

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Abstract

The first manufactured insulin pump was introduced in the 1970s and the first insulin pens in 1985; since then, many improvements have been made to both devices. The advantages of pens over syringes have been confirmed in numerous studies and include greater accuracy, ease of use, patient satisfaction, quality of life, and adherence. United States claims database analyses indicate that the improved adherence made possible by use of an insulin pen has the potential to reduce diabetes care costs when compared with using a vial and syringe. Features of certain advanced pump models include the ability to connect wirelessly to a blood glucose meter or to a subcutaneous interstitial glucose sensor for semicontinuous glucose-driven insulin rate adjustment. A new trend in the design of insulin pumps is the tubing-free patch pump that adheres directly to the skin. The low rate of insulin pen usage in the United States compared with European countries and the fact that many patients report that they are not offered the option of an insulin pen by their physician suggest that there is a need to increase patient and provider awareness of the currently available devices for insulin administration.

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Abbreviations: (A1C) glycated hemoglobin, (BG) blood glucose, (CI) confidence interval, (CSII) continuous subcutaneous insulin infusion, (DCCT) Diabetes Control and Complications Trial, (DKA) diabetic ketoacidosis, (FDA) Food and Drug Administration, (MDI) multiple daily injections, (MPR) medication possession ratio, (OR) odds ratio, (QALY) quality-adjusted life year, (RCT) randomized controlled trial, (UKPDS) United Kingdom Prospective Diabetes Study

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