

## FlexPen<sup>®</sup> and KwikPen<sup>™</sup> Prefilled Insulin Devices: A Laboratory Evaluation of Ergonomic and Injection Force Characteristics

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### Abstract

#### **Background:**

Advances in insulin pen technology continue to improve the usability of these devices for patients with diabetes. In this study, ergonomic features and injection force, as measured by glide force (GF) and glide force variability (GFV), were evaluated for the new Humalog<sup>®</sup> Mix75/25 KwikPen<sup>™</sup> (KwikPen) and compared with the NovoLog<sup>®</sup> Mix 70/30 FlexPen<sup>®</sup> (FlexPen).

#### **Methods:**

Fifty prefilled insulin pen devices (25 of each type) were measured for diameter at the cartridge holder and dose window, length and weight with cap attached, and thumb reach at 30 and 60 units. GF was also determined for 100 devices (50 of each type); GFV at 30 and 60 unit doses was calculated for the plateau portion of the force curve based on the minimum and maximum force measured in that portion of the curve.

#### **Results:**

While FlexPen was lighter in weight than KwikPen, and presented a slightly smaller diameter at the cartridge holder and dose window, KwikPen had a shorter overall pen length compared to FlexPen, with a shorter thumb reach at both the 30- and 60-unit dose settings. The maximum GF for KwikPen was less than FlexPen at both the 30-unit (3.42 vs 5.36 lb,  $p < 0.0001$ ) and 60-unit doses (3.61 vs 5.62,  $p < 0.0001$ ). KwikPen GFV was lower across both doses (mean difference: -0.46 lb at 30 units, -0.44 lb at 60 units;  $p < 0.0001$  for both).

#### **Conclusions:**

While FlexPen was lighter with a slightly smaller cartridge holder and dose window diameter, KwikPen was shorter in length with less thumb reach than FlexPen. KwikPen also demonstrated lower GF and GFV, resulting in a smoother injection profile than FlexPen. These features of KwikPen's design and function may offer important advantages for the user during insulin administration.

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**Abbreviations:** (ANOVA) analysis-of-variance, (GF) glide force, (GFV) glide force variability, (rDNA) recombinant DNA

**Keywords:** ergonomic, glide force, injection force, insulin pen

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