BACKGROUND

• Insulin therapy for patients with type 1 and type 2 diabetes (T1D, T2D) may comprise a combination of basal insulin and mealtime insulin (MTI).1

• Total insulin and MTI doses are increasing due to optimising insulin therapy and increasing weight2, hence patients are requiring more MTI pens/cartridges.

• MTI pens/cartridges will generally not contain an exact multiple of the dose required, and patients may behave in several different ways around the transition from a used pen/cartridge to a new one.2

• These behaviours may include patients taking additional injections, taking less insulin than prescribed or wasting insulin.

• A patient survey was undertaken to better understand the insulin wastage behaviours of patients with T1D or T2D taking >20 units/day of MTI and those disposable prefilled pen or reusable pen with disposable cartridge (PP/C).

OBJECTIVES

• Primary objective: estimate the amount of MTI wasted by patients, based on their injection habits when insufficient insulin is in their PP/C to administer a full dose in a single injection.

• Secondary objectives: understood T1D and T2D patients’ behaviour and attitudes towards MTI use by evaluating overall patient experience of insulin therapy and attitudes/behaviours around MTI.

METHODS

Study design and population

• Cross-sectional, online, self-reported survey of MTI usage and wastage behaviours in adults (aged ≥18 years) with T1D or T2D using >20 units/day of MTI administered via 100 units/ml PP/C for 21 month, conducted between February and March 2015 in France, Germany, Italy and the United Kingdom.

• Patients excluded if only insulin taken was mixed/biphasic, intermediate or long acting, or if administered MTI with syringe and insulin vial or insulin pump, or used pen to fill a pump.

Survey design

• Survey comprised:
  - questions on sociodemographic and health characteristics;
  - validated patient-reported outcome questionnaires including the EuroQol-5D (EQ-5D-5L) to assess health-related quality of life (HRQoL) and the Perceptions of Insulin Therapy Questionnaire (PITQ, formerly the Experience with Insulin Therapy Questionnaire [EWTQ]) to assess attitudes, behaviour and confidence towards insulin therapy; and
  - questions specific to MTI usage and wastage behaviour, and attitudes towards MTI use.

• Final questionnaire was pilot tested for comprehension and then translated into local languages.

Statistical methods

• All patients who provided consent to release information, fulfilled study entry criteria and completed the survey were included in analyses.

• Insulin wastage, covariates (sociodemographic and health characteristics), attitudes to insulin MTI and wastage, and HRQoL were summarised using descriptive statistics.

• Patients were divided into two groups: those wasting any amount of insulin and those wasting no insulin at all.

• Bivariate statistics were performed comparing patients who wasted no insulin with patients who wasted some insulin. Significant differences between groups were further analysed with two-step model which was also bootstrapped (1000 replications) to obtain more reliable standard errors for coefficients.

• All results were confirmed with multivariate analyses.

RESULTS

Demographics and baseline characteristics

• The survey was completed by a total of 400 patients with diabetes (120 T1D, 280 T2D), comprising 100 patients (30 T1D, 70 T2D) per country.

• Overall, 145 patients (36.3%) reported discarding PP/Cs that still contained insulin, whereas 255 patients (63.8%) reported not wasting insulin.

• Demographics and baseline characteristics are shown in Table 1.

• No statistically significant differences between groups at baseline with regards to last HbA1c, diabetes care provider, or recent exercise or weight loss measures.

Insulin usage and wastage behaviour

• Insulin usage and wastage behaviour is summarised in Table 2.

• Overall, patients reported taking mean (SD) 54.8 (34.1) MTI units per day (16.5 [13.6] at breakfast, 17.1 [13.2] at lunch and 21.2 [13.9] at dinner, combined).

• Patients wasting insulin used significantly more PP/Cs per month and incurred significantly more out-of-pocket costs associated with insulin use, on average, than patients wasting no insulin.

Table 1. Demographics and baseline characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Wasteful insulin</th>
<th>Total (N=400)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs, mean (SD)</td>
<td>45 (9.2)</td>
<td>45 (10.2)</td>
</tr>
<tr>
<td>Gender, male, n (%)</td>
<td>189 (48.3)</td>
<td>184 (46.5)</td>
</tr>
<tr>
<td>Body mass index, kg/m², mean (SD)</td>
<td>28.7 (5.8)</td>
<td>29.0 (7.2)</td>
</tr>
<tr>
<td>Employed or part-time, n (%)</td>
<td>30 (9.1)</td>
<td>30 (9.0)</td>
</tr>
<tr>
<td>Completed university, n (%)</td>
<td>63 (20.9)</td>
<td>64 (16.3)</td>
</tr>
<tr>
<td>Household income, n (%)</td>
<td>11.0 (7.7)</td>
<td>11.1 (7.7)</td>
</tr>
<tr>
<td>Below-below</td>
<td>150 (41.1)</td>
<td>152 (39.5)</td>
</tr>
<tr>
<td>Above-below</td>
<td>179 (45.1)</td>
<td>181 (45.3)</td>
</tr>
<tr>
<td>Don’t know/unable to answer</td>
<td>32 (12.5)</td>
<td>45 (16.0)</td>
</tr>
<tr>
<td>Time since diagnosis, yrs, mean (SD)</td>
<td>14.8 (10.2)</td>
<td>14.8 (10.2)</td>
</tr>
<tr>
<td>No-insulin diabetes treatment, n (%)</td>
<td>16.0 (4.0)</td>
<td>16.0 (4.0)</td>
</tr>
<tr>
<td>Diet alone</td>
<td>182 (46.0)</td>
<td>180 (44.5)</td>
</tr>
<tr>
<td>Oral medications alone</td>
<td>160 (41.0)</td>
<td>160 (41.0)</td>
</tr>
<tr>
<td>No-insulin injectable</td>
<td>16.0 (4.0)</td>
<td>16.0 (4.0)</td>
</tr>
<tr>
<td>Charlson Comorbidity index, median (SD)</td>
<td>3.0 (5.0)</td>
<td>3.0 (5.0)</td>
</tr>
</tbody>
</table>

* p-value for patients reporting insulin wastage vs. patients reporting no wastage, not for cardinal variables

Table 2. Insulin usage and wastage behaviour

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Wasteful insulin</th>
<th>Total (N=400)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General insulin usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time on MTI, mean (SD)</td>
<td>8.6 (7.2)</td>
<td>8.7 (7.2)</td>
</tr>
<tr>
<td>Type of pens, n (%)</td>
<td>0.50 (0.5)</td>
<td>0.50 (0.5)</td>
</tr>
<tr>
<td>No. of injections per day</td>
<td>3.5 (0.5)</td>
<td>3.7 (0.5)</td>
</tr>
<tr>
<td>No. of PP/C used per month</td>
<td>9.3 (14.1)</td>
<td>11.3 (18.9)</td>
</tr>
<tr>
<td>Out-of-pocket costs (€)(N=254)</td>
<td>8.1 (21.1)</td>
<td>25.4 (34.5)</td>
</tr>
</tbody>
</table>

* p-value for patients reporting insulin wastage vs. patients reporting no wastage, not for cardinal variables

When insufficient insulin remained in PP/C to provide full dose, 63.5% of patients reported discarding PP/C containing insulin on average two times per month, each containing more than 8 units of insulin.

• When insufficient insulin remained in PP/C to provide a full dose, almost two thirds of patients reported administering two injections and 15.0% reported taking a smaller than recommended dose.

• Potential opportunities to eliminate wastage behaviours, such as higher-sting insulin formulations containing more units per pen, which would reduce the number of transitions between PP/Cs, might be advantageous.

CONCLUSIONS

• Transitions from a used PP/C to a new one can present patients with a challenge with respect to obtaining their correct insulin dose per month without wasting insulin, adding undue inconvenience associated with two injections, skipping doses or taking less insulin than prescribed.

• Attitudes towards insulin wastage use, specifically towards MTI use, were not part of a validated questionnaire, although pilot interviews were performed to ensure comprehensiveness and comprehensibility.

REFERENCES

4. Acknowledgements: The authors thank Sue Williamson and Kathy Croom (Rx Communications, Mold, UK) for medical writing assistance during the preparation of this poster, funded by Eli Lilly and Company.

Figure 1. Attitudes towards MTI use

1. I would feel guilty about wasting medication if I did not use all the insulin in my PP/C.
2. I would feel it’s a waste of money if I didn’t use all the insulin in the PP/C.
3. I usually strive to use all the insulin in my PP/C even if it means I have to inject myself twice to get a full dose.
4. I would feel good about not wasting any insulin by using two PP/Cs to get my full dose.

Attitudes towards mealtime insulin use

• Figure 1 presents patient’s attitudes towards their MTI use.

• Significant differences between the two groups reported in attitudes towards cost, convenience and injection issues.

• Patients wasting insulin found it more frustrating, time consuming and painful to inject twice, preferring to discard some insulin if necessary.

• Patients wasting no insulin were more concerned about wasting medicine or throwing away money, and were more inclined to use the insulin in their PP/C, even if they had to inject twice to get a full dose.

LIMITATION

• Questions relating to insulin usage and wastage, and attitudes specifically towards MTI use, were not part of a validated questionnaire, although pilot interviews were performed to ensure comprehensiveness and comprehensibility.

• Transitions from a used PP/C to a new one can present patients with a challenge with respect to obtaining their correct insulin dose per month without wasting insulin, adding undue inconvenience associated with two injections, skipping doses or taking less insulin than prescribed.

• Potential opportunities to eliminate wastage behaviours, such as higher-sting insulin formulations containing more units per pen, which would reduce the number of transitions between PP/Cs, might be advantageous.