For patients struggling with diabetes, Continuous Glucose Monitors (CGMs) provide them with regular updates on their glucose levels. This critical information is sent via Bluetooth from the CGM to the patient’s smart device. Some devices may not communicate well with the CGMs: messages may be lost in transmission or only received after a long delay.

Dexcom must test smart devices with their CGMs and reject devices with insufficient communication performance, as well as rejecting all untested devices. Dexcom wants to use device specifications to predict whether smart devices will have sufficiently high performance with their CGMs.

Our data processing involved the following steps, as outlined in the flowchart:
1. Web-scrape and clean device specifications data from GSMArena
2. Extract device performance data from Dexcom’s internal database
3. Join the two datasets into a final data table for modeling and prediction
4. Split the data into two groups: training (for modelling) and testing (for measuring model performance)

Feature selection:
There are many device specifications available but not all of them are useful for predicting device performance with CGMs. To avoid overfitting and for efficiency, we only kept the important features which we expect to relate to device communication.

Important device specifications are shown below:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Memory</th>
<th>Comms</th>
<th>Battery</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Internal</td>
<td>WLAN</td>
<td>Type</td>
<td>Battery Life</td>
</tr>
<tr>
<td>Chipset</td>
<td></td>
<td>Bluetooth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td></td>
<td>NFC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPU</td>
<td></td>
<td>Radio</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyzing and interpreting data requires considering the impact of various confounding variables such as OS version, app version, hardware version, and battery optimization.

Lower Packet Capture Rate (Bad)
- WLAN Wi-Fi 802.11
- Battery type Li-Po (vs. Li-ion)
- Chipset = new Kirin

Higher Packet Capture Rate (Good)
- GPU = newPowerVR
- Higher minimum CPU speed

Long Gaps Per Day
Of 59 predictors used in the linear regression, 36 were statistically significant based on 95% confidence intervals.

Coefficient Conf. Intervals
- Significant
- Not significant

Overall, we find that certain device specifications are significantly correlated with performance in communication with CGMs. Though our findings are limited by various imperfections in the device specification data, these findings provide a proof-of-concept for the use of (licensed, clean & structured) device specifications in the prediction of smart device performance.

This has the capability to either better guide Dexcom in selecting new devices worth testing, or ultimately remove the necessity of lab-testing new smart devices entirely. Either would have great implications in cost-savings and better serving patients.