**SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED)**

## I. GENERAL INFORMATION

Device Generic Name: Automated Insulin Dosing System

Device Trade Name: MiniMed™ 780G System

Device Procode: OZP

Applicant's Name and Address: Medtronic MiniMed, Inc.
18000 Devonshire Street
Northridge, CA 91325

Date(s) of Panel Recommendation: None

Premarket Approval Application (PMA) Number: P160017/S118

Date of FDA Notice of Approval: April 18, 2025

The original PMA for the MiniMed 670G system (P160017) was approved on September 28, 2016, for use in persons ages 14 years and older. PMA Panel Track Supplement P160017/S017, approved on February 13, 2018, added the upper arm as an alternate insertion site for the Guardian™ Sensor (3). PMA Panel Track Supplement P160017/S031, approved on June 21, 2018, expanded the indication for pediatric patients 7 to 13 years of age. PMA Panel Track Supplement P160017/S076, approved on August 31, 2020, expanded the indications for the MiniMed 770G system to include pediatric patients down to 2 years old and changed the pump communication protocol to Bluetooth Low Energy (BLE). PMA Panel Track Supplement P160017/S091, approved on April 21, 2023, introduced the MiniMed 780G System, added the Advanced Hybrid Closed Loop (AHCL) algorithm, and added compatibility with the Guardian 4 Continuous Glucose Monitor (CGM). The SSED to support the indications are available on the CDRH website and are incorporated by reference here.

The current Panel Track Supplement updates the AHCL algorithm and adds compatibility to the new Simplera Sync™ CGM as an alternative CGM component for the system. The updated algorithm includes modifications to the calculation of auto correction boluses and daily user adaptations. The MiniMed 780G system with updated AHCL algorithm is compatible only with the Simplera Sync and Guardian 4 CGMs.

## II. INDICATIONS FOR USE

The MiniMed 780G system is indicated for use with either the Simplera Sync Sensor, or with the Guardian 4 sensor/Guardian 4 transmitter. Indications for use for the MiniMed 780G system are provided for each of the two system configurations separately:

***MiniMed 780G System with Simplera Sync Sensor:***

The MiniMed 780G system is intended for the continuous delivery of basal insulin at selectable rates, and the administration of insulin boluses at selectable amounts for the management of type 1 diabetes mellitus in persons 7 years of age and older requiring insulin. The system is also intended to continuously monitor glucose values in the fluid under the skin. The MiniMed 780G system includes SmartGuard technology, which can be programmed to automatically adjust insulin delivery based on continuous glucose monitoring (CGM) sensor glucose values and can suspend delivery of insulin when the SG value falls below or is predicted to fall below predefined threshold values.

The MiniMed 780G system consists of the following devices:

- MiniMed 780G insulin pump
- Simplera Sync
- Accu-Chek™ Guide Link blood glucose meter
- Accu-Chek Guide Test Strips

The system requires a prescription from a healthcare professional.

*Simplera Sync Sensor*

The Simplera Sync sensor is intended for use with the MiniMed 780G system to monitor glucose levels for the management of diabetes.
The Simplera Sync sensor can be used one time and has a life of up to 6 days, followed by a grace period of 24 hours. During the grace period, the sensor will continue to work as it did during the first 6 days, to allow the patient to change their sensor more flexibly. However, some sensors may not survive the full wear period for a variety of reasons. Please be prepared to replace the sensor during the grace period to ensure sensor glucose values continue to be monitored.

The Simplera Sync sensor is not intended to be used directly to make therapy adjustments while the MiniMed 780G is operating in Manual mode. All therapy adjustments in Manual mode should be based on measurements obtained using a blood glucose meter and not on values provided by the Simplera Sync sensor. The Simplera Sync sensor has been studied and is approved for use in the systems, insertion sites, and ages listed in the following table.

| System | Approved Age | Sensor Insertion Site |
|---|---|---|
| MiniMed 780G system | 7 years and older | Arm |

*Accu-Chek Guide Link Blood Glucose Monitoring System*

The Accu-Chek Guide Link Blood Glucose Monitoring System is comprised of the Accu-Chek Guide Link meter and the Accu-Chek Guide test strips. The Accu-Chek Guide Link Blood Glucose Monitoring System is intended to quantitatively measure glucose in fresh capillary whole blood from the fingertip, palm, and upper arm as an aid in monitoring the effectiveness of glucose control.

The Accu-Chek Guide Link Blood Glucose Monitoring System is intended for in vitro diagnostic single-patient use by people with diabetes. The Accu-Chek Guide Link Blood Glucose Monitoring System is intended to be used by a single person and should not be shared.

This system is not for use in diagnosing or screening for diabetes mellitus and not for neonatal use. Alternative site testing should be done only during steady-state times (when glucose is not changing rapidly). The Accu-Chek Guide Link Blood Glucose Monitoring System is intended to be used to wirelessly transmit glucose values to the MiniMed 780G system and MiniMed 770G system with Bluetooth™ wireless technology through the use of Bluetooth low energy communication.

***MiniMed 780G System with Guardian 4 Sensor and Guardian 4 Transmitter:***

The MiniMed 780G system is intended for continuous delivery of basal insulin at selectable rates, and the administration of insulin boluses at selectable amounts for the management of type 1 diabetes mellitus in persons 7 years of age and older requiring insulin. The system is also intended to continuously monitor glucose values in the fluid under the skin. The MiniMed 780G system includes SmartGuard technology, which can be programmed to automatically adjust insulin delivery based on continuous glucose monitoring (CGM) sensor glucose values and can suspend delivery of insulin when the SG value falls below or is predicted to fall below predefined threshold values.

The MiniMed 780G system consists of the following devices:

- MiniMed 780G insulin pump
- Guardian 4 transmitter
- Guardian 4 sensor
- One-press serter
- Accu-Chek Guide Link blood glucose meter
- Accu-Chek Guide Test Strips

The system requires a prescription from a healthcare professional.

*Guardian 4 sensor*

The Guardian 4 sensor is intended for use with the MiniMed 780G system and the Guardian 4 transmitter to monitor glucose levels for the management of diabetes. The sensor is intended for single use and requires a prescription. The Guardian 4 sensor is indicated for up to 7 days of continuous use.

The Guardian 4 sensor is not intended to be used directly to make therapy adjustments while the MiniMed 780G is operating in manual mode. All therapy adjustments in manual mode should be based on measurements obtained using a blood glucose meter and not on values provided by the Guardian 4 sensor.

The Guardian 4 sensor has been studied and is approved for use in the systems, insertion sites, and ages listed in the following table.

| System | Age | Sensor Insertion Site |
|---|---|---|
| MiniMed 780G system | 7 years and older | Arm |

*One-press Serter*
The serter is used as an aid for inserting the sensor. It is indicated for single-patient use and it is not intended for multiple-patient use.

*Guardian 4 transmitter*
The Guardian 4 transmitter is intended for use with the MiniMed 780G system and Guardian 4 sensor to monitor glucose levels for the management of diabetes.

*Accu-Chek Guide™ Link Blood Glucose Monitoring System*
The Accu-Chek Guide Link Blood Glucose Monitoring system is comprised of the Accu-Chek Guide Link meter and the Accu-Chek Guide test strips. The Accu-Chek Guide Link Blood Glucose Monitoring System is intended to quantitatively measure glucose in fresh capillary whole blood from the fingertip, palm, and upper arm as an aid in monitoring the effectiveness of glucose control. The Accu-Chek Guide Link Blood Glucose Monitoring System is intended for in-vitro diagnostic single-patient use by people with diabetes. The Accu-Chek Guide Link Blood Glucose Monitoring System is intended to be used by a single person and should not be shared. This system is not for use in diagnosing or screening for diabetes mellitus and not for neonatal use. Alternative site testing should be done only during steady-state times (when glucose is not changing rapidly). The Accu-Chek Guide Link Blood Glucose Monitoring System is intended to be used to wirelessly transmit glucose values to the MiniMed 780G system and MiniMed 770G system with Bluetooth wireless technology through the use of Bluetooth low energy communication.

## III. CONTRAINDICATIONS

A prominent boxed warning is included in the labeling regarding use of the device:

> "Do not use the SmartGuard feature for a period of time after giving a manual injection of insulin by syringe or pen. Manual injections are not accounted for in the active insulin amount. Using the SmartGuard feature too soon after a manual injection may result in over-delivery of insulin and may cause hypoglycemia. Consult a healthcare professional for how long to wait after a manual injection before using the SmartGuard feature."

The following contraindications for this device are also described in the labeling:

**MiniMed 780G System with Simplera Sync Sensor:**

- The MiniMed 780G system is contraindicated for use in persons under age 7.
- Pump therapy is not recommended for people with a significant cognitive or physical impairment that affects their ability to safely operate the pump, including a lack of physical dexterity.
- Pump therapy is not recommended for children who are not under the care of a parent or caregiver who is capable of safely operating the pump for the patient.
- The reservoir is contraindicated for the infusion of blood or blood products. Infusion sets are indicated for subcutaneous use only and not for intravenous (IV) Infusion.
- Infusion sets are not indicated for the infusion of blood or blood products.
- Insulin pump therapy is not recommended for persons who are unwilling or unable to perform BG meter readings.
- Pump therapy is not recommended for people who are unwilling or unable to maintain contact with their healthcare professional.

**MiniMed 780G System with Guardian 4 Sensor and Guardian 4 Transmitter:**

- The MiniMed 780G system is contraindicated for use in persons under age 7.
- Do not use the serter to insert sensors other than the Guardian 4 sensor. Medtronic cannot guarantee the safety or efficacy of this product if used with other sensors.
- The reservoir is contraindicated for the infusion of blood or blood products.
- Infusion sets are indicated for subcutaneous use only and not for intravenous (IV) infusion.
- Infusion sets are not indicated for the infusion of blood or blood products.
- Pump therapy is not recommended for persons who are unwilling to or unable to perform BG meter readings.
- Pump therapy is not recommended for people who are unwilling or unable to maintain contact with their healthcare professional.

## IV. WARNINGS AND PRECAUTIONS

The warnings and precautions can be found in the MiniMed 780G system labeling.

## V. DEVICE DESCRIPTION

***The MiniMed 780G System is comprised of the following devices:***

MiniMed 780G Pump (MMT-1884)

The MiniMed 780G pump (model MMT-1884) is an ambulatory, battery-operated, rate-programmable micro-infusion pump designed to deliver insulin from a reservoir. The reservoir is driven by a motor to deliver pre-determined basal rate profiles and user-selected bolus amounts of insulin into the subcutaneous tissue through an infusion set.

The MiniMed 780G pump is offered in one model (MMT-1884). The pump houses electronics, a pumping mechanism, a user interface, and a medication reservoir within the same physical device. The reservoir is attached to a tube that connects to the user's infusion site on their body. The pump is intended to deliver insulin through a diffusion mechanism. Model MMT-1884 is compatible with a 3.0 mL reservoir. The pump only displays blood glucose level units in mg/dL and this units setting cannot be reconfigured by the user.

In addition to insulin delivery, the MiniMed 780G pump is designed to receive and display real-time interstitial fluid glucose values from a compatible CGM. The MiniMed 780G pump with updated AHCL algorithm is compatible with two CGMs: the Guardian 4 sensor with Guardian 4 transmitter and Simplera Sync sensor. When used in combination with a CGM, the transmitter sends sensor signals to the MiniMed 780G pump via a BLE wireless communication protocol every five minutes.

When using the 780G pump with the Guardian 4 sensor with Guardian 4 transmitter and Simplera Sync sensor, calibration is not required. However, the system is designed to use every BG meter reading either entered manually or received from a linked glucose meter to calibrate the sensor.

The 780G Pump can operate in Manual Mode or Auto Mode, and each mode includes various features and capabilities. These features and capabilities are described in detail in the MiniMed 780G system user guide. A summary of these features and capabilities is provided in Table 1, below.

*Table 1:* Summary of the Features of the MiniMed 780G System

| Mode | Description | When is it Active? | Will I receive Alerts? |
|---|---|---|---|
| Manual Mode: Insulin Infusion Pump | This mode is when the device is functioning as a pump that can deliver insulin, but the device does not have a sensor connected, is not in Auto Mode and the insulin suspend features are not turned on. | This is the default mode and the user does not have to specifically turn this mode on. | There are alerts if the pump has any issues with delivering insulin (e.g. suspended delivery) or low reservoir. |
| Manual Mode: Sensor Augmented Pump | This mode is when the device is functioning as a sensor and pump, but the device is not in Auto Mode and the insulin suspend features are not turned on. | This user has to be wearing a CGM that is communicating to the pump in order to receive sensor glucose alerts. | There is a mandatory severe low alarm for the system used with each compatible CGM; 64 mg/dL for Guardian 4 and Simplera Sync. The user can also set optional high and low alerts to sound on or before setting sensor glucose levels. |
| Manual Mode: Suspend On Low | When this feature is active the device detects that your sensor glucose level has reached a pre-set sensor glucose value and it automatically suspends basal insulin delivery when that value is reached. | The user has to turn this feature on. It is not available when Auto Mode is turned on, and it cannot be turned on if Suspend before Low is turned on. | There is a mandatory severe low alarm for the system used with each compatible CGM: 64 mg/dL Guardian 4 CGM and Simplera Sync and at the pre-set low level. The user can also set optional high alerts to sound on or before set sensor glucose levels, and an optional alert before low alert. |
| Manual Mode: Suspend Before Low | When this feature is active the device detects when your sensor glucose is predicted to reach a pre-set value and it automatically suspends basal insulin delivery before that value is reached. | The user has to turn this feature on. It is not available when Auto Mode is turned on, and it cannot be turned on if Suspend before Low is turned on. | There is a mandatory severe low alarm for the system used with each compatible CGM: 64 mg/dL Guardian 4 and Simplera Sync CGM and at the pre-set low level. The user can also set optional high alerts to sound on or before set sensor glucose levels, and an optional alarm before low alert. |

| Mode | Description | When is it Active? | Will I receive Alerts? |
|---|---|---|---|
| Auto Mode | When this mode is active, the device can automatically adjust basal insulin by increasing, decreasing, or turning off basal insulin delivery based on sensor glucose levels. The device can also automatically deliver an auto correction bolus without the user input based on the sensor glucose levels. | The user has to turn this mode on and certain pre-defined conditions have to be met. | There is a mandatory severe low alarm for the system used with each compatible CGM: 64 mg/dL Guardian 4 and Simplera Sync CGM and a mandatory high alarm if user is ≥250 mg/dL for 3 hours; The user can also set optional high and low alerts to sound on or before set sensor glucose levels. |
| Auto Mode: Safe Basal Delivery | When this feature is active, the device will deliver basal insulin at a patient-specific safe basal or safe basal low rate for no longer than 90 minutes. If the fault condition resolves within 90 minutes, the system will begin to automatically adjust basal insulin again. If the fault does not resolve within 90 minutes, the system will switch to Manual Mode. | This feature turns on when the system determines that either the sensor data is not adequate for Auto Mode or delivery at the minimum or maximum limit for a set amount of time has elapsed. | There is a mandatory alert before this feature turns on when the sensor glucose accuracy check fails. The user can also set optional alerts to sound before this feature turns on when minimum or maximum insulin delivery times out or when the sensor has been under- reading for too long.<br>There is a mandatory severe low alarm for the system used with each compatible CGM: 64 mg/dL Guardian 4 CGM and Simplera Sync. The user can also set optional high and low alerts to sound on or before set sensor glucose levels. |

*Guardian 4 transmitter (MMT-7841)*

The Guardian 4 transmitter is a portable, electrical current meter intended to process, store, and transmit glucose sensor values to the compatible insulin pump. The transmitter sends sensor glucose (DG) values and sensor integrity (SI) data from the Guardian 4 sensor to the MiniMed 780G insulin pump via BLE wireless communication protocol. The Guardian 4 transmitter does not require entry of fingerstick blood glucose measurement for calibration purposes.

*Guardian 4 sensor (MMT-7040)*

The Guardian 4 sensor is a sterile, single-use, single patient glucose sensing component for continuous monitoring of glucose levels in the user's interstitial fluid for up to seven days. The Sensor is inserted into the subcutaneous tissue using the One-Press Serter and is taped

to the user's skin. It connects to the Guardian 4 transmitter, which in turn communicates with the MiniMed 780G pump.

*Simplera Sync Sensor (MMT- 5120)*
The sensor is a sterile, all-in-one glucose sensing device, intended as a single patient, single-use component of a personal CGM system for the management of diabetes in persons 7 years of age and older. The Simplera Sync sensor can be used one time and has a life of up to six days, followed by a grace period of 24 hours. During the grace period, the sensor will continue to work as it did during the first six days, to allow the patient to change their sensor more flexibly. The sensor calculates user glucose concentrations based on collected signals from the interstitial fluid and transmits glucose and device data to the networked device. It is intended to replace fingerstick blood glucose (BG) readings for treatment decisions and reduce the overall burden associated with diabetes management.

*Accu-Chek Guide™ Link Blood Glucose Meter*
The Accu-Chek Guide™ Link Blood Glucose Meter can be used with the MiniMed 780G system. The meter sends blood glucose values to the insulin pump for sensor calibration via a BLE wireless communication protocol. The blood glucose meter was previously reviewed and approved under P160017/S076.

*Additional System Accessories*
The following additional accessory devices listed in Table 2 are compatible with the MiniMed 780G Insulin Pump:

*Table 2:* Accessory Devices

| Reservoirs and Infusion Sets | Model Numbers |
|---|---|
| MiniMed Quick Set infusion set | MMT-386, MMT-387, MMT-394, MMT-396, MMT-397, MMT-398, MMT-399 |
| MiniMed Silhouette infusion set | MMT-368, MMT-377, MMT-378, MMT-381, MMT-382, MMT-383, MMT-384 |
| MiniMed Mio Infusion set | MMT-921, MMT-923, MMT-925, MMT-941, MMT-943, MMT-945, MMT-965, MMT-975 |
| MiniMed Sure-T infusion set | MMT-862, MMT-864, MMT-866, MMT-874, MMT-876, MMT-884, MMT-886 |
| MiniMed Mio Advance infusion set | MMT-213A, MMT-242, MMT-243A, MMT-244A |
| Medtronic Extended infusion set | MMT-430A, MMT-431A, MMT-432A, MMT-433A, MMT-440A, MMT-441A, MMT-442A, MMT-443A |
| MiniMed reservoir | MMT-332A |
| Medtronic Extended reservoir | MMT-342 |

| Optional Devices | Model Numbers |
|---|---|
| MiniMed Mobile Application (Android) | MMT-6101 |
| MiniMed Mobile Application (iOS) | MMT-6102 |
| CareLink Connect Application (Android) | MMT-6111 |
| CareLink Connect Application (iOS) | MMT-6112 |
| Blue Adapter | ACC-190 |
| CareLink Online (Personal) | MMT-7333 |
| CareLink Pro | MMT-7335 |
| Medtronic Diabetes Updates Application (Android) | MMT-6121 |
| Medtronic Diabetes Updates Application (iOS) | MMT-6122 |

This medical device product has functions subject to FDA premarket review as well as functions (e.g., the MiniMed Mobile Applications) that are not subject to FDA premarket review. For this application, if the product has functions that are not subject to FDA premarket review, FDA assessed those functions only to the extent that they either could adversely impact the safety and effectiveness of the functions subject to FDA premarket review or they are included as a labeled positive impact that was considered in the assessment of the functions subject to FDA premarket review.

## VI. ALTERNATIVE PRACTICES AND PROCEDURES

Control of diabetes can be achieved through a combination of various behaviors and methods.

Self-behaviors including healthy eating, taking the clinically indicated medications (pharmaco-vigilance), and being physically active are fundamental lifestyle activities that are important for achieving glycemic control regardless of the methods of monitoring glucose and insulin administration.

Methods of monitoring glycemic control include periodic measurement of Hemoglobin A1c (HbA1c) which reflects mean blood levels control over a three-month period. This test is ordered and interpreted by the person with diabetes' (PWDs) healthcare provider. Self-monitoring of blood glucose using glucose meters and test strips provides quantitative measurements of blood glucose at a single point in time for PWDs and their healthcare providers. This helps to monitor the effectiveness of glycemic control, as well as in making more immediate treatment modifications.

PWDs may administer insulin by injection or using other insulin infusion pumps as prescribed by their physician. An insulin pump is an alternative to multiple daily insulin injections (via insulin syringe or an insulin pen). There are currently several commercially available ambulatory insulin infusion pumps that can be used for insulin infusion. Additionally, sensor-augmented insulin infusion pumps or continuous glucose monitoring systems may be used to record continuous interstitial glucose information and provide real-time hypoglycemia and hyperglycemia alerts. Several available insulin pump systems offer automated features where insulin delivery may be suspended when sensor glucose has reached or is predicted to reach a user selected low glucose threshold. Hybrid closed loop insulin pump systems are also available for people with type 1 diabetes. These systems can automatically increase or decrease the amount of insulin delivered to maintain glucose within an optimal range.

Each alternative has its own advantages and disadvantages. A patient should fully discuss these alternatives with his/her physician to select the method that best meets expectations and lifestyle.

## VII. MARKETING HISTORY

The MiniMed 780G system has been commercially available in Europe since October 2020. The MiniMed 780G system has been commercially available in the US since May 2023.

The MiniMed 780G system is an iteration of the MiniMed 770G system (identical to the MiniMed 670G except it has Bluetooth communication capability). The MiniMed 670G system was originally approved for marketing in the United States on September 28, 2016 (P160017).

The insulin reservoirs and infusion sets used with the MiniMed 780G system are also the same as those currently used with the MiniMed 530G system (P120010), the MiniMed 630G system (P150001), the MiniMed 670G system (P160017), and the MiniMed 770G system (P160017/S076). These devices have not been withdrawn from commercial distribution for any reason related to either safety or effectiveness.

## VIII. POTENTIAL ADVERSE EFFECTS OF THE DEVICE ON HEALTH

Potential device-related serious adverse events include

- Diabetic ketoacidosis (DKA) resulting from high blood glucose due to suspension of insulin delivery or inadequate insulin delivery (which may result from catheter occlusion, hardware or software malfunction, erroneous CGM readings in Auto Mode or suspend mode, or inadequate insulin dosing).
- Severe hypoglycemia resulting from over-delivery of insulin (which can result

from hardware or software malfunction, erroneous CGM readings in Auto Mode, or erroneous insulin dosing), which may lead to seizure, unconsciousness and, rarely, death.

Potential device related non-serious events include:

- Skin irritation or redness
- Infection
- Pain or discomfort
- Bruising
- Edema
- Rash
- Bleeding
- Induration of skin
- Allergic reaction to adhesive

Sensor breakage with fragments retained under the skin is a potential adverse event related to use of the CGM component of the 780G system, but this was not observed during the clinical studies. Based on post-market experience with similar devices and the results observed in the clinical studies described below, the occurrence and severity of these events are low.

Infection at the insulin pump infusion set insertion site and sensor insertion site is a potential complication related to insertion of the CGM or the insulin pump infusion set. Based on post-market experience with similar devices, and the results observed in clinical studies, the occurrence and severity of these events are not expected to differ from other approved infusion sets and CGM devices.

Insulin pump use is known to carry an increased risk of DKA. However, FDA has received information indicating some patients are willing to accept an increased risk of DKA or ketosis and hyperglycemia (severe hyperglycemia) because of the benefits of pump use (see also Section XII below).

Like other insulin pumps, there is an inherent risk that users of the device who do not use the 780G system as intended could harm themselves. Therefore, the device is for prescription use only and contraindicated for people unwilling or unable to perform fingerstick blood glucose meter readings and for people unwilling or unable to maintain contact with their healthcare professional.

As demonstrated under P120010/S046 for the MiniMed 530G system (which has the same 'suspend on low' feature, where insulin delivery will suspend for two hours after the low glucose threshold has been reached), two-hour suspension of insulin delivery is unlikely to lead to clinically significant ketosis or ketoacidosis even if the pump inappropriately

suspends when blood sugar is normal or elevated and should respond to insulin therapy and hydration within a few hours.

There is a theoretical risk of insulin over-delivery due to device malfunction, which has a risk of leading to severe hypoglycemia due to malfunction of the 780G system. However, this event did not occur during the pivotal study. If insulin over-delivery were to occur, there are several mechanisms in place, designed to help detect and mitigate the risk of impending and/or current hypoglycemia, including the presence of alarms/alerts and insulin delivery suspension/reduction.

There is a theoretical risk of insulin under-delivery (due to a hardware or software malfunction) which may lead to severe hyperglycemia or DKA due to malfunction of the 780G system. However, this event did not occur during the pivotal study or the continuation phase of the pivotal study. If insulin under-delivery were to occur, there are mechanisms in place to help detect impending and/or current hyperglycemia, including the presence of alerts and alarms.

The consequences of falsely high glucose readings on the CGM would be potential over-delivery of insulin via automated insulin delivery and missed low glucose suspensions and alerts/alarms, which have the potential to lead to severe hypoglycemia.

The consequences of falsely low glucose readings on the continuous glucose monitor would be potential under-delivery of insulin and missed high glucose alerts, which have the potential to lead to severe hyperglycemia or DKA.

For the specific adverse events that occurred in the clinical studies, please see Section X below.

## IX. SUMMARY OF NON-CLINICAL STUDIES

### A. Laboratory Studies

Verifications was performed on the full MiniMed 780G system (i.e. MiniMed 780G pump, transmitters, BG meter, MiniMed Mobile App, CareLink, and CareLink Connect App) to ensure that the devices are compatible, and that data is successfully transferred. Please see the SSED for P160017/S076 and P160017/S091 for all other system testing.

Two hardware configurations (A1 and A2) are available for the 780G pump. Pre-clinical testing of the MiniMed 770G pump hardware supports the safe use of the 780G pump with the A1 configuration as the corresponding pumps contain identical hardware. Please see the SSEDs for P160017, and P160017/S076 for descriptions of pre-clinical testing of the

MiniMed 780G pump with the A1 configuration. See approval of P160017/S116 for details on design changes, component material changes and manufacturing changes impacting the MiniMed 780G pump with the A2 configuration.
The One-Press Serter remains unchanged. Please see the SSED for P160017 for descriptions of the pre-clinical testing of the One-Press Serter.

The Accu-Chek Guide™ Link Meter remains unchanged since its approval under P160017/S076. Please see the SSED for P160017/S076 for descriptions of the pre-clinical testing of the Accu-Chek Guide™ Link Meter.

The Guardian 4 CGM remains unchanged since its approval under P160017/S091. Please see the SSED for P160017/S091 for descriptions of the pre-clinical testing of the Guardian 4 CGM.

Pre-clinical testing was performed on the Simplera Sync Sensor (MMT-5120). These pre-clinical studies included environmental, mechanical, and functional testing. The testing is summarized in Table 3.

*Table 3:Simplera Sync Sensor Functional and Environmental Tests*

| Test Name | Test Parameter | Acceptance Criteria |
|---|---|---|
| Chemical Compatibility | Demonstrate the ability of the transmitter to withstand exposure to chemicals used in the cleaning procedure | No cracks, crazing, dissolving, or discoloration of the transmitter surface |
| Drop Test per EN 60601-1 | Demonstrate safe operation after three repeated 1-meter drops onto 50 mm thick hardwood | Each unit must pass visual inspection, accuracy test, RF test, and leak test |
| Random Vibration Test per EN 60601-1-11 | Demonstrate reliable operation after exposure to 10-100 Hz @ (1 m/s2)2/Hz, 100-200 Hz @ -3dB/octave, and 200-2000 Hz @ 0.5 (m/s2)2/Hz for 30 minutes in each axis | Each unit must pass visual inspection, accuracy test, and RF test |
| Mechanical Shock per IEC 60601-1-11 | Demonstrate reliable operation after exposure to 150 m/s2 (15g) acceleration, with three shocks per axis in each direction (±X, Y, Z) for | Each unit must pass visual inspection, accuracy test, and RF test |

| Test Name | Test Parameter | Acceptance Criteria |
|---|---|---|
| | a total of 18 shocks | |
| Environmental storage conditions | Withstand 2 to 30ºC, up to 95% relative humidity | Each unit must pass visual inspection, accuracy test, and RF test |
| Temperature Shock Test | Demonstrate reliable performance after cycling from 0 to 45 ºC with 5-minute ramp time and 2 hour dwell time at each plateau | Each unit must pass accuracy test and RF test |
| Operating Environmental Conditions | Demonstrate the ability to operate with temperature of 2-40 ºC, 15-95% relative humidity, 700-1060 hPa | Each unit must pass visual inspection, accuracy test, and RF test |
| Fluid ingress per IP48 (International Protection) per IEC 60529 | Demonstrate reliable operation of the transmitter after submerged to a depth of 8ft for 30 minutes | Each unit must pass visual inspection, accuracy test, and RF test. All device weights must vary by less than 0.001g before and after test. |
| Protection against solid foreign objects per IP4X (International Protection) per IEC 60529 | Demonstrate that the full diameter of 1.0mm spherical probe cannot pass through any opening of the transmitter | The full diameter of a 1.0mm spherical probe cannot pass through any opening of the transmitter. |

The Simplera Sync Sensor was also subjected to Electromagnetic Compatibility (EMC) testing to confirm that the devices will function properly in the presence of electromagnetic signals that may be encountered in the intended use environment. The testing is summarized in Table 4.

*Table 4: Simplera Sync Sensor Functional and Environmental Tests*

| Test Name | Test Parameter | Acceptance Criteria |
|---|---|---|
| EMC/EMI Testing per EN 60601-1-2:2015 | Demonstrate ability of the system to operate in environments with EMI which meet the standard of EN 60601-1-2:2015 | No unrecoverable observations and no latent effects resulting from exposure – transmitter must pass accuracy test |

| Test Name | Test Parameter | Acceptance Criteria |
|---|---|---|
| Wireless Coexistence | Demonstrate ability of system to withstand expected levels of wireless transmission from other sources | No observations at the applied levels and no latent effects resulting from exposure – transmitter must pass accuracy test |
| FCC and Avionics | Demonstrate compatibility with FCC regulation | Emitted levels must be per FCC CFR 47 Part 15.247. |
| X-ray Immunity | Demonstrate reliable operation when exposed to x-ray – 100kV, 100 uA exposure for 2 minutes | No observations at the applied levels and no latent effects resulting from exposure – transmitter must pass accuracy test |
| RF Performance | Demonstrate reliable system operation when multiple systems are operating within close proximity | No observations at the applied levels and no latent effects resulting from exposure – transmitter must pass accuracy test. Data only exchanged between paired devices. |
| Electronic article surveillance immunity | Demonstrate that the system operates reliably when exposed to EMI from electronic article surveillance equipment | No observations at the applied levels and no latent effects resulting from exposure – transmitter must pass accuracy test |
| Cell phone and cordless phone immunity | Demonstrate that the system operates reliably when exposed to EMI specifically in common cell phone spectra (800-960 MHz and 1700-2200 MHz @ 1MHz steps) using WCDMA, WCDMA/3GPP, GSM/EDGE, DECT, IS95, PHS, NADC, PDC, and cordless phone spectra (2400 and 900 MHz) | No observations at the applied levels and no latent effects resulting from exposure – transmitter must pass accuracy test |

All protocols, test reports, and acceptance criteria have been reviewed and found to be acceptable. All devices met all pre-defined acceptance criteria during testing.

1. Packaging
   Medtronic packages all devices to meet the requirements for shipping as defined in ASTM D4169, Standard Practice for Performance Testing of Shipping Containers and Systems.

   Pre-clinical testing performed on the MiniMed 770G pump hardware and packaging supports the 780G pump as the corresponding pump hardware and packaging are identical. Please see the SSED for P160017/S076 for packaging validation. Please see the SSED for P160017/S091 for descriptions of the pre-clinical packaging validation conducted for Guardian 4 Transmitter and Guardian 4 Sensor. Please see approval of P160017/S116 for details on design changes, component material changes and manufacturing changes impacting the MiniMed 780G System packaging.

2. Software
   Software documentation was provided consistent with FDA guidance document *Content of Premarket Submissions for Device Software Functions*. Software development activities included establishing detailed software requirements, linking requirements with associate verification tests, software code reviews, unit testing, system level testing and defect tracking and dispositioning to ensure the software conforms to user needs and intended uses.

3. Firmware Over the Air (FOTA)
   The MiniMed 780G pump has the capability to securely receive and install firmware-over-the-air (FOTA) updates, via the FOTA app. Verification of the FOTA functionality in the MiniMed 770G pump software, which supports safe use of the FOTA feature, is relevant for the 780G pump as the FOTA architecture and components are identical for both pumps. Please see the SSED for P160017/S076 and P160017/S093 for details regarding pre-clinical testing of the FOTA functionality.

4. Human Factors Testing
   Human Factors usability validation studies were conducted in accordance with the IEC 62366-1 standard entitled *Medical Devices – Application of Usability Engineering to Medical Devices* and the FDA Guidance Document entitled *Applying Human Factors and Usability Engineering to Medical Device*.

The sponsor conducted usability validation studies to evaluate use of the MiniMed 780G system by patients with type 1 diabetes mellitus ages 7 years and older. These studies address use of the 780G system with compatible CGMs: Simplera Sync and Guardian 4 sensor / Guardian 4 transmitter.

Task Analyses were conducted to determine 780G system critical tasks. For all the usability studies conducted, all use errors, close calls and use difficulties observed during completion of critical tasks were analyzed, and the root causes and impacts were assessed. For any use errors and close calls, a residual risk analysis was performed to: (a) determine whether design changes would further reduce the risks, and (b) assess the residual risks in relation to the benefits to the patient. It was determined that no design changes were necessary. Overall, the human factors usability validation studies and assessment demonstrated that the MiniMed 780G system, used with either the Simplera Sync CGM or the Guardian 4 CGM, is safe and effective for use by patients ages 7 years and older with type 1 diabetes.

### B. Animal Studies

Animal studies were performed during early stages of development to assess the impact of ethylene oxide (EtO) sterilization on the Simplera Sync sensor performance.

### C. Additional Studies

Not Applicable

## X. SUMMARY OF PRIMARY CLINICAL STUDY(IES)

The applicant performed two clinical studies to establish a reasonable assurance of safety and effectiveness of the MiniMed 780G System with the Simplera Sync CGM and the Guardian 4 sensor for the management of Type 1 diabetes in the US under IDE #G220306 and G200156. Data from these clinical studies were the basis for the PMA approval decision. A summary of the clinical studies is presented below.

*Table 5: Summary of P160017/S118 Clinical Studies*

| Clinical Study | IDE | Patient Population | Study Design/Objective |
|---|---|---|---|
| Safety and Effectiveness Evaluation of the MiniMed™ 780G System Used in Combination with the | G220306 | 7-80 years | Multi-center, single arm study in insulin-requiring adult and pediatric subjects with type 1 diabetes.<br><br>The objective of the study was to |

| Clinical Study | IDE | Patient Population | Study Design/Objective |
|---|---|---|---|
| Simplera Sync CGM | | | evaluate the safety and efficacy of the MiniMed 780G insulin pump used in combination with the Simplera Sync Sensor in a home setting. |
| Performance Evaluation with CGM in Adults, Adolescents, and Pediatrics | G200156 | 2-80 years | Multi-center, randomly assigned, prospective, single-sample correlational design without controls.<br><br>The primary objective of the study was to demonstrate the accuracy of Disposable Sensor (Simplera Sync) when used over a period of 7 days (i.e., 170 hours) in subjects 2-80 years of age. |

In addition to the clinical study reports, the sponsor provided further analyses of real world evidence (RWE) of performance and safety of the MiniMed 780G system used with both the Guardian 4 Sensor and the Simplera Sync sensor obtained from outside of the US (OUS). These analyses demonstrated that use of the MiniMed 780G system is as safe and effective when used with the Simplera Sync sensor as with the Guardian 4 sensor.

**Safety and Effectiveness Evaluation of the MiniMed™ 780G System Used in Combination with the Simplera Sync CGM (G220306)**

**A. Study Design**

The study was a multi-center, single-arm study for adult and pediatric subjects with type 1 diabetes in a home setting. Subjects were first enrolled March 17, 2023 and completed the study on October 30, 2023.

A total of 250 subjects aged 7–77 years with type 1 diabetes were enrolled at 25 investigational sites across the United States, and 212 of those subjects completed the study period. Of the 212 subjects who completed the study, 107 were age 7-17 years and 105 were age 18 and older (see subject accountability below).

Subjects participated in a two-week run-in phase followed by a 90-day study phase. After the run-in period, subjects were instructed to use the study devices with both the SmartGuard feature and the Auto correction feature turned ON during a study period comprising 3 stages. In the first two stages, subjects were instructed to use the study pump with the 120 mg/dL Auto Basal target setpoint and active insulin time set to 4 hours (stage

1), then to change the pump settings to the 100 mg/dL setpoint and active insulin time set to 2-3 hours (stage 2). In stage 3, subjects were instructed to use the study pump with the Auto Basal target setpoint and active insulin time set as considered best by the investigator for the individual subject.

1. Clinical Inclusion and Exclusion Criteria

***Inclusion Criteria***

i. Age 7 - 80 years at time of screening.

ii. Has a clinical diagnosis of type 1 diabetes:
   a. 14 – 80 years of age: A clinical diagnosis of type 1 diabetes for 2 years or more as determined via medical record or source documentation by an individual qualified to make a medical diagnosis.
   b. 7 – 13 years of age: A clinical diagnosis of type 1 diabetes for 1 year or more as determined via medical record or source documentation by an individual qualified to make a medical diagnosis.

iii. Does not require a legally authorized representative to consent on their behalf due to mental or intellectual disability.

iv. Subject or parent/caregiver is literate and able to read the language offered in the pump or pump materials.

v. Subject and/or legally authorized representative is willing to provide informed consent for participation.

vi. Is willing to perform fingerstick blood glucose measurements as needed.

vii. Is willing to wear the system continuously throughout the study.

viii. Must have a minimum daily insulin requirement (Total Daily Dose) of greater than or equal to 8 units.

ix. Has a Glycosylated hemoglobin (HbA1c) less than 10% (as processed by Central Lab) at time of screening visit.
Note: All HbA1c blood specimens will be sent to and tested by a National Glycohemoglobin Standardization Program (NGSP) certified Central Laboratory. HbA1c testing must follow NGSP standards.

x. Has thyroid-stimulating hormone (TSH) in the normal range OR if the TSH is out of normal reference range the Free T3 is below or within the lab's reference range and Free T4 was within the normal reference range.

xi. Uses pump therapy for greater than 6 months prior to screening (with or without CGM experience).

xii. Is willing to upload data from the study pump, and has Internet access, and a computer system, or compatible smartphone that meets the requirements for uploading the study pump.

xiii. Is willing to take one of the following insulins and can financially support the use of insulin preparations as required by the study:
   - Humalog (insulin lispro injection)
   - NovoLog (insulin aspart injection)
   - Admelog (insulin lispro injection)

***Exclusion Criteria***

i. Has a history of 2 or more episodes of severe hypoglycemia, which resulted in any of the following during the 6 months prior to screening:
    a. Medical assistance (i.e; Paramedics, Emergency Room [ER] or Hospitalization)
    b. Coma
    c. Seizures
ii. Has been hospitalized or had visited the ER in the 6 months prior to screening resulting in a primary diagnosis of uncontrolled diabetes.
iii. Has DKA in the last 6 months prior to screening visit.
iv. Is unable to tolerate tape adhesive in the area of sensor placement as assessed by a qualified individual.
v. Has any unresolved adverse skin condition in the area of sensor placement (e.g; psoriasis, dermatitis herpetiformis, rash, Staphylococcus infection).
vi. Is female of child-bearing potential and result of pregnancy test is positive at screening.
vii. Is sexually active female of child-bearing potential and is not using a form of contraception deemed reliable by the investigator.
viii. Is female and plans to become pregnant during the course of the study.
ix. Is being treated for hyperthyroidism at time of screening.
x. Has diagnosis of adrenal insufficiency.
xi. Has taken any oral, injectable, or intravenous (IV) glucocorticoids within 8 weeks from time of screening visit, or plans to take any oral, injectable, or IV glucocorticoids during the course of the study.
xii. Is using hydroxyurea at time of screening or plans to use it during the study.
xiii. Is actively participating in an investigational study (drug or device) wherein he/she has received treatment from an investigational study drug or investigational study device in the last 2 weeks.
xiv. Has used a MiniMed 780G pump prior to screening.
xv. Is currently abusing illicit drugs.
xvi. Is currently abusing marijuana.
xvii. Is currently abusing prescription drugs.
xviii. Is currently abusing alcohol.
xix. Is using pramlintide (Symlin), DPP-4 inhibitor, liraglutide (Victoza or other GLP-1 agonists), metformin, canagliflozin (Invokana or other SGLT2 inhibitors) at time of screening.
xx. Has a history of visual impairment which would not allow subject to participate in the study and perform all study procedures safely, as determined by the investigator.
xxi. Has elective surgery planned that requires general anesthesia during the course of the study.
xxii. Has sickle cell disease, hemoglobinopathy; or has received red blood cell transfusion or erythropoietin within 3 months prior to time of screening.
xxiii. Plans to receive red blood cell transfusion or erythropoietin over the course of study participation.
xxiv. Is diagnosed with current eating disorder such as anorexia or bulimia.

xxv. Has been diagnosed with chronic kidney disease resulting in chronic anemia.
xxvi. Has a hematocrit that is below the normal reference range of lab used.
*xxvii.* Is on dialysis.
xxviii. Has serum creatinine of >2 mg/dL.
xxix. Has celiac disease that is not adequately treated as determined by the investigator.
xxx. Has had any of the following cardiovascular events within 1 year of screening: myocardial infarction, unstable angina, coronary artery bypass surgery, coronary artery stenting, transient ischemic attack, cerebrovascular accident, angina, congestive heart failure, or ventricular rhythm disturbances.
xxxi. Has had history of cardiovascular event 1 year or more from the time of screening without
   a. a normal EKG and stress test within 6 months prior to screening or during screening or
   b. clearance from a qualified physician prior to receiving the study devices if there is an abnormal EKG or stress test.
xxxii. Has 3 or more cardiovascular risk factors listed below without a normal EKG within 6 months prior to screening or during screening or clearance from a qualified physician if there is an abnormal EKG:
   - Age >35 years
   - Type 1 diabetes of >15 years' duration
   - Presence of any additional risk factor for coronary artery disease
   - Presence of microvascular disease (proliferative retinopathy or nephropathy, including microalbuminuria)
   - Presence of peripheral vascular disease
   - Presence of autonomic neuropathy
xxxiii. Is a member of the research staff involved with the study.
xxxiv. Is a Medtronic Diabetes employee or their immediate family member (excluding adult children and/or adult siblings).

2. Follow-up Schedule

There were three scheduled office visits throughout the run-in period. During the first visit, subjects were consented, screened for eligibility and had blood collected for an HbA1c test. The remaining visits were meant to allow the subjects to familiarize themselves with the study devices.

Throughout the study period there were a number of scheduled visits (telephone calls and office visits). These visits were meant to ensure that the subject was healthy and to remind them to adhere to the study requirements, for example, reminders to only insert glucose sensors in locations that are specified in the User Guide materials.

During the final visit, subjects were asked to return the study devices, complete some questionnaires about their experience and also had blood collected for an HbA1c test.

3. Clinical Endpoints

The following descriptive endpoints were evaluated separately for subjects 7-17 and 18-80 years old.

- Time spent in the SmartGuard feature versus time spent in Manual Mode
- Change in mean glucose value from baseline to end-of-study
- Time in different ranges (% of SG): SG < 70 mg/dL, 70 mg/dL ≤ SG ≤ 140 mg/dL, SG > 140 mg/dL, 180 mg/dL, 250 mg/dL, and 350 mg/dL
- Number of Events, Area Under Curve (AUC) and Time in the hyperglycemic range: SG > 140 mg/dL, 180 mg/dL, 250 mg/dL, and 350 mg/dL
- Number of Events, AUC and Time in the hypoglycemic range: SG < 54 mg/dL and 70 mg/dL
- Change of Total Daily Dose (TDD) of insulin from baseline to end-of-study
- Change of weight from baseline to end-of-study
- Subgroup analysis will be performed for:
    - Setpoint
        - 100 mg/dL
        - 110 mg/dL
        - 120 mg/dL
        - 150 mg/dL (Temp Target Usage)

Safety Data Summarized

- Serious Adverse Events (SAE)
- Serious Adverse Device Effects (SADE)
- Unanticipated Adverse Device Effects
- Incidence of Severe Hypoglycemia
- Incidence of Severe Hyperglycemia
- Incidence of DKA

## B. Accountability of PMA Cohort

- A total of 250 subjects aged 7–80 years with type 1 diabetes were enrolled in the study at 25 investigational sites across the United States.
- Of the 250 subjects enrolled, 125 subjects were 7-17 years of age and 107 of these subjects completed the study phase.
- Of the 250 subjects enrolled, 125 subjects were 18-75 years of age and 105 of these subjects completed the study phase.

## C. Study Population Demographics and Baseline Parameters

The table below provides a high-level summary of the population demographics of 7–80-year-old subjects that entered the study period with Auto Mode (i.e. intended-to-treat population). The demographics of the study population are typical for a clinical study performed in the US.

*Table 6. Summary of Subject Demographic and Other Baseline (at Screening) Characteristics, ITT Population*

| Characteristic | Age 7-17 Years Number of Subjects =112 | Age 18-80 Years Number of Subjects= 110 |
|---|---|---|
| **AGE (Years)** | | |
| Number of Subject N | 112 | 110 |
| Mean (SD) | 13.3 (3.0) | 46.7 (15.8) |
| Median | 13.0 | 48.0 |
| Min, Max | 7.0, 17.0 | 18.0, 77.0 |
| **Gender N (%)** | | |
| Female | 48 (42.9%) | 56 (50.9%) |
| Male | 64 (57.1%) | 54 (49.1%) |
| **Race N (%)** | | |
| White | 95 (84.8%) | 104 (94.5%) |
| Asian, White | 4 (3.6%) | 0 (0.0%) |
| Asian, Native Hawaiian / Other Pacific Islander | 0 (0.0%) | 1 (0.9%) |
| American Indian or Alaska Native | 0 (0.0%) | 1 (0.9%) |
| American Indian or Alaska Native, Asian, White | 1 (0.9%) | 0 (0.0%) |
| American Indian or Alaska Native, White | 1 (0.9%) | 0 (0.0%) |
| Asian | 2 (1.8%) | 1 (0.9%) |
| Asian, Black or African American | 1 (0.9%) | 0 (0.0%) |
| Black or African American | 6 (5.4%) | 3 (2.7%) |
| Black or African American, White | 1 (0.9%) | 0 (0.0%) |
| Other (Moroccan) | 1 (0.9%) | 0 (0.0%) |
| **Ethnicity N (%)** | | |
| Hispanic or Latino | 10 (8.9%) | 5 (4.5%) |
| Not Hispanic or Latino | 101 (90.2%) | 105 (95.5%) |
| Not reported | 1 (0.9%) | 0 (0.0%) |
| **Diabetes History (Years)** | | |

| Characteristic | Age 7-17 Years Number of Subjects =112 | Age 18-80 Years Number of Subjects= 110 |
|---|---|---|
| Number of Subject N | 112 | 110 |
| Mean (SD) | 7.1 (3.8) | 26.0 (14.4) |
| Median | 6.4 | 24.8 |
| Min, Max | 1.2, 16.4 | 2.6, 60.3 |
| **Baseline Height (cm)** | | |
| Number of Subjects N | 112 | 110 |
| Mean (SD) | 160.1 (15.9) | 171.4 (9.1) |
| Median | 162.0 | 170.1 |
| Min, Max | 120.3, 188.9 | 152.0, 193.6 |
| **Baseline Weight (kg)** | | |
| Number of Subjects | 112 | 110 |
| Mean (SD) | 57.7 (19.3) | 84.8 (19.5) |
| Median | 59.1 | 82.3 |
| Min, Max | 25.1, 116.0 | 46.6, 140.6 |
| **Baseline Body Mass Index ($kg/m^2$)** | | |
| Number of Subjects | 112 | 110 |
| Mean (SD) | 21.9 (4.8) | 28.8 (5.9) |
| Median | 21.2 | 28.2 |
| Min, Max | 14.1, 39.7 | 16.0, 53.2 |
| **Treatment Method at Baseline N (%)** | | |
| Closed Loop Therapy (Pump + CGM + Algorithm) | 96 (85.7%) | 82 (74.5%) |
| CSII | 3 (2.7%) | 10 (9.1%) |
| Injection | 2 (1.8%) | 0 (0.0%) |
| Other | 1 (0.9%) | 0 (0.0%) |
| SAP (Pump + CGM) | 10 (8.9%) | 18 (16.4%) |
| **Baseline HbA1c (%)** | | |
| Number of Subjects N | 112 | 110 |

| Characteristic | Age 7-17 Years Number of Subjects =112 | Age 18-80 Years Number of Subjects= 110 |
|---|---|---|
| Mean (SD) | 7.7 (1.0) | 7.4 (0.9) |
| Median | 7.8 | 7.3 |
| Min, Max | 5.5, 9.9 | 5.6, 9.8 |

## D. Safety and Effectiveness Results

Safety and effectiveness results were evaluated separately for subjects 18-80 years of age and 7-17 years of age.

1. Safety Results

   The safety of the device was assessed by evaluating the incidence of all serious Adverse Events (AEs), Adverse Device Events (ADEs), Serious Adverse Device Events (SADEs), and Unanticipated Adverse Device Effects (UADEs) experienced by study subjects. AEs were listed in terms of severity and relationship to the device.

   *Subjects Ages 7-17 years*

   A total of 83 adverse events (AEs) during the study period were reported from all investigational sites for 7–17-year-old study subjects enrolled in the study. There were 0 serious adverse event, no reports of severe hypoglycemia, 8 reports of severe hyperglycemia, no reports of diabetic ketoacidosis, and there were no reports of unanticipated adverse device effects (UADEs).

   *Subjects Ages 18-80 Years of Age*

   A total of 50 adverse events (AEs) during the study period and three serious adverse events were reported from all investigational sites for 18–80-year-old study subjects enrolled in the study.

   Out of 50 events, there were 3 serious adverse events, 2 reports of hypoglycemia and 1 report of hyperglycemia events, there was 1 report of diabetic ketoacidosis events, and no reports of unanticipated adverse device effects (UADEs).

2. Effectiveness Results

   The data below describes how the device performed during the 780G/Simplera Sync pivotal study (G220306). This study compared the results of subjects prior to using the auto correction bolus (run-in period - 2 weeks) against results while using the auto correction bolus (study period - 3 months). However, the study did not

evaluate subjects who were not using a system equipped with the auto correction bolus (i.e., there was no control group).

***Change in HbA1c***

The overall mean change in HbA1c from baseline to end of 3-month study period is shown in Table 7 below. The percentage of subjects that had an HbA1c value less than 7% at baseline and after the study period changed from 19.6% to 36.9% for subjects aged 7-17, and 30.9% to 68.9% for subjects aged 18 and older.

*Table 8: Difference in HbA1c from Baseline to End of 3-month Study Period*

| Category | Subject 7-17 Years of Age | | | Subject 18-80 Years of Age | | |
|---|---|---|---|---|---|---|
| | Baseline Mean ± SD (Median) [N] | End of Study Mean ± SD (Median) [N] | Change from Baseline to End of Study (95% Confidence Interval) | Baseline Mean ± SD (Median) [N] | End of Study Mean ± SD (Median) [N] | Change from Baseline to End of Study (95% Confidence Interval) |
| HbA1C | 7.7 ± 1.0 (7.8) [112] | 7.3 ± 0.8 (7.2) [111] | -0.4% (-0.6%, -0.3%) | 7.4 ± 0.9 (7.3) [110] | 6.7 ± 0.5 (6.7) [106] | -0.7% (-0.8%, -0.6%) |

**% Time in Range (TIR, 70-180 mg/dL)**

The mean % of TIR (70-180 mg/dL) is shown in Table 8 below. The percentage of subjects that had a TIR greater than 70% at baseline and after the study period changed from 16.1% to 57.8% for subjects aged 7-17, and 38.2% to 86.9% for subjects aged 18 and older.

*Table 9: Mean % of Time in Range (70-180 mg/dL) in Study Period Stage 3*

| Subject Age | Number of Subjects | Mean | 95% Confidence Interval |
|---|---|---|---|
| 7-17 Years | 109 | 71.4% | (69.5%, 73.3%) |
| 18-80 Years | 107 | 80.2% | (78.7%, 81.8%) |

***% Time below 54/mg/dL***

The mean % of time < 54 mg/dL is shown in Table 9 below.

*Table 10: Mean % of Time <54 mg/dL in Study Period Stage 3, ITT Population*

| Subject Age | Number of Subjects | Mean | 95% Confidence Interval |
|---|---|---|---|
| 7-17 Years | 109 | 0.4% | (0.3%, 0.4%) |
| 18-80 Years | 107 | 0.2% | (0.1%, 0.3%) |

**SmartGuard Use**

During the study period, subjects were instructed to use SmartGuard with Auto Correction ON. *Table 10* presents the percentage of time that subjects spent using the sensor and the percentage of time spent using the SmartGuard (Auto mode) feature with the Auto correction feature turned ON.

*Table 10. Sensor and Auto Mode Usage (Percentage of Time) During Study Period, Stage 3*

| Category | Age 7-17 Years (N = 111) | Age 18-80 Years (N = 110) |
|---|---|---|
| Time spent using sensor | 92.9% | 95.8% |
| Time spent not using sensor | 7.1% | 4.2% |
| Time spent in SmartGuard | 93.5% | 96.6% |
| Time spent in Manual mode | 6.5% | 3.4% |

**SmartGuard Performance**

*Table 11* shows the mean percentage of SG values in specific glucose ranges during the run-in period and during stage 3 of the study period by all subjects using the 780G system with the Simplera Sync sensor.

*Table 11. Percentage of SG values in Different Ranges during the Run-In Period and Study Period Stage 3*

| Category | SG Range (mg/dL) | Age 7-17 Years | | Age 18-80 Years | |
|---|---|---|---|---|---|
| | | Run-in period (N = 112) | Study Period Stage 3 (N = 109) | Run-in period (N = 110) | Study Period Stage 3 (N = 107) |
| Low SG Value | <54 | 0.3 ± 0.6 (0.2, 0.4) | 0.4 ± 0.3 (0.3, 0.4) | 0.3 ± 0.5 (0.2, 0.4) | 0.2 ± 0.4 (0.1, 0.3) |
| | <70 | 1.6 ± 1.7 (1.3, 1.9) | 1.9 ± 1.4 (1.7, 2.2) | 1.7 ± 1.9 (1.4, 2.1) | 1.5 ± 1.4 (1.3, 1.8) |
| Target SG Value | 70 – 140 | 32.1 ± 14.1 (29.5, 34.7) | 49.2 ± 9.7 (47.4, 51.0) | 39.2 ± 13.0 (36.8, 41.7) | 56.1 ± 10.5 (54.1, 58.1) |
| | 70 – 180 | 54.4 ± 15.7 (51.5, 57.3) | 71.4 ± 9.9 (69.5, 73.3) | 66.5 ± 12.6 (64.1, 68.8) | 80.2 ± 8.1 (78.7, 81.8) |
| High SG Value | > 140 | 66.3 ± 14.7 (63.5, 69.0) | 48.9 ± 10.0 (47.0, 50.8) | 59.1 ± 13.9 (56.4, 61.7) | 42.4 ± 11.0 (40.3, 44.5) |
| | > 180 | 44.0 ± 16.1 (41.0, 47.0) | 26.7 ± 10.1 (24.7, 28.6) | 31.8 ± 13.1 (29.4, 34.3) | 18.2 ± 8.4 (16.6, 19.9) |
| | > 250 | 16.4 ± 11.1 (14.3, 18.5) | 8.0 ± 6.6 (6.8, 9.3) | 7.4 ± 6.1 (6.2, 8.5) | 3.4 ± 3.0 (2.8, 4.0) |
| | > 350 | 2.4 ± 3.5 (1.8, 3.1) | 1.3 ± 2.2 (0.9, 1.8) | 0.4 ± 0.7 (0.3, 0.5) | 0.3 ± 0.5 (0.2, 0.4) |

Note: Values are presented by Mean ± SD (95% CI) except Number of subjects

Table 12 shows the difference in mean sensor glucose from baseline to the end of the study period for all subjects using the 780G system with the Simplera Sync sensor.

*Table 12. Difference in Mean Sensor Glucose Values (mg/dL) between the Run-In Period and Study Period Stage 3*

| Category | Age 7-17 Years | | | Age 18-80 Years | | |
|---|---|---|---|---|---|---|
| | **Run-in period (N = 112)** | **Study Period Stage 3 (N = 109)** | **Difference between Run-in Period and Study Period Stage 3 (N = 109)** | **Run-In Period (N = 110)** | **Study Period Stage 3 (N = 107)** | **Difference between Run-in Period and Study Period Stage 3 (N = 107)** |
| Mean Glucose Value | 180.4 ± 27.1 (175.3, 185.4) | 154.4 ± 17.6 (151.0, 157.7) | -26.2 ± 22.2 (-30.4, -22.0) | 161.0 ± 18.7 (157.5, 164.5) | 142.2 ± 12.8 (139.7,144.7) | -18.5 ± 14.0 (-21.2, -15.8) |

During the study period, some subjects wore the study pump with the SmartGuard feature and the Auto correction feature turned ON, and with the target setpoint set to either 100 mg/dL, 110 mg/dL, 120 mg/dL, or 150 mg/dL (Temp Target) for at least an entire day. *Table 13* shows the mean sensor glucose (SG) value for each target setpoint option when that setpoint was used for the entire day during the overall study period.

*Table 13. Mean Sensor Glucose Values (mg/dL) during SmartGuard Use Stratified by Target Glucose Setpoint during the Study Period*

| Category | Age 7-17 Years | | | | | Age 18-80 Years | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Target Glucose (mg/dL) | | | | | Target Glucose (mg/dL) | | | |
| | **Overall (N=112)** | **100 (N=109)** | **110 (N=12)** | **120 (N=111)** | **150 (N=52)** | **Overall (N=109)** | **100 (N=107)** | **110 (N=5)** | **120 (N=108)** | **150 (N=48)** |
| Mean Glucose Values During SmartGuard | 153.6 ± 14.4 (150.9, 156.3) | 151.9 ± 15.0 (149.1, 154.8) | 149.5 ± 16.5 (139.0, 160.0) | 157.8 ± 14.6 (155.1, 160.6) | 157.3 ± 44.4 (145.0, 169.7) | 143.8 ± 12.2 (141.4, 146.1) | 141.0 ± 11.9 (138.7, 143.3) | 139.8 ± 11.2 (125.9, 153.7) | 150.5 ± 12.4 (148.1, 152.8) | 137.5 ± 29.0 (129.1, 145.9) |

Note 1: Values are presented by Mean ± SD (95% CI).

Note 2: Analysis of data was only performed when SmartGuard Glucose target was used the entire day (e.g., 100 mg/dL set point used for entire day versus 110 mg/dL set point used for entire day versus 120 mg/dL set point used for entire day). Any day with partial usage was excluded from this analysis.

**Change in Total Daily Dose of Insulin and Body Weight**

Table 14 shows the change in total daily dose of insulin (TDD) and weight from baseline to the end of the study. Mean TDD increased for both pediatric and adult subjects. In the 7-17 years old population, 33 subjects gained more than 2.5 kg (5.5 lbs) in weight over the 3-month study period, and of these, 13 subjects gained 5 kg (11 lbs) or more.

*Table 14. Changes in Mean TDD and Weight*

| **Category** | **Age 7-13 Years** | | **Age 14-17 Years** | | **Age 18-80 Years** | |
|---|---|---|---|---|---|---|
| **TDD (U), Mean ± SD (Median)** | **Run-in Period (N = 57)** | **Study Period Stage 3 (N = 55)** | **Run-in Period (N = 55)** | **Study Period Stage 3 (N = 54)** | **Run-in Period (N = 110)** | **Study Period Stage 3 (N = 107)** |
| | 43.2 ± 24.0 (35.7) | 50.3 ± 29.7 (40.6) | 64.3 ± 23.7 (59.0) | 75.0 ± 29.3 (71.9) | 54.7 ± 27.1 (50.9) | 57.8 ± 28.0 (50.0) |
| **Weight* (kg), Mean ± SD (Median)** | **Run-in Period (N = 57)** | **End of Study (N = 56)** | **Run-in Period (N = 55)** | **End of Study (N = 55)** | **Run-in Period (N = 110)** | **End of Study (N = 108)** |
| | 47.1 ± 17.9 (44.1) | 49.0 ± 19.2 (45.8) | 68.7 ± 14.0 (66.7) | 70.3 ± 14.6 (68.9) | 84.8 ± 19.5 (82.3) | 84.8 ± 19.3 (82.0) |
| **BMI Z-score*, Mean ± SD (Median)** | **Run-in Period (N = 57)** | **End of Study (N = 56)** | **Run-in Period (N = 55)** | **End of Study (N = 55)** | -- | -- |
| | 0.6 ± 1.0 (0.6) | 0.7 ± 1.1 (0.7) | 0.5 ± 1.0 (0.6) | 0.6 ± 1.0 (0.8) | -- | -- |

*Note: Weight and height were not collected in-clinic for some subjects.

3. Pediatric Extrapolation

As described above in section A. Study Design, the clinical data include pediatrics down to 7 years of age. Therefore, other existing pediatric data was not leveraged.

**Performance Evaluation with Simplera Sync CGM in Adults, Adolescents, and Pediatrics (G200156)**

The applicant performed a clinical study to evaluate the accuracy of the Simplera Sync CGM in subjects 2–80 years of age for the span of approximately 7 days (170 hours). A summary of the clinical study is presented below.

*Table 15. Details of the Simplera Sync Pivotal Study*

| Parameter | G200156<br>(Simplera Sync Pivotal Study) |
|---|---|
| Clinical Study Protocol Title | Performance Evaluation with CGM in Adults, Adolescents, and Pediatrics |
| Objective of Study | To demonstrate the accuracy of Simplera Sync when used over a period of 7 days (i.e., 170 hours) with the system in subjects 2-80 years of age. |
| Study Design and Type of Control | Multi-center, randomly assigned, prospective, single-arm study without controls |
| No. of Subjects/Population Completed Study | Up to 376 previously-diagnosed type 1 and 2 diabetes subjects<br>N=118 subjects 18–80 years old<br>N=112 subjects 2–17 years old |

## A. Study Design

The Simplera Sync Pivotal study was a multi-center, randomly assigned, prospective, single-sample correlational design without controls. Subjects were randomly assigned to frequent sample testing (FST) day, and FST time. Subjects wore the devices (with sensors) up to a 7-day training period, followed by a 7-day study period. Investigational center staff ensured 176-188 hours of sensor wear (sensors could be removed at that time or after that time to ensure that the devices were not removed pre-maturely). In the event when early sensor removal occurred during the training period, the subjects were able to continue their participation in the study period based on the discretion of the principal investigator.

During this pivotal study sensor data were collected in a blinded approach, where the Simplera Sync was used as a recorder for the purpose of data collection. There was no real time data communication during the study.

During Yellow Springs Instruments (YSI)/ Self-Monitoring of Blood Glucose (SMBG) frequent sample testing (FST), venous blood glucose concentrations were measured periodically. These values were compared to sensor glucose values (SG)) to determine sensor accuracy. At the end of the study, raw sensor data collected by the Simplera Sync

were processed through the final Athena Plus algorithm, using the zero-calibration scheme for analysis through the end of the study.

A total of 243 previously-diagnosed type 1 or type 2 diabetes subjects were enrolled to have 230 subjects including 118 adult subjects (18–80 years old) and 112 pediatric subjects (2-17 years of age) complete the study. Performance of the Simplera Sync CGM in the 18-80 years old population has been described in the SSED for the Simplera system (P160007/S047). Therefore, the following section only includes performance data of the Simplera Sync CGM in the 7-17 years old population to support its use in the Minimed 780G System.

1. Clinical Inclusion and Exclusion Criteria

***Inclusion Criteria***

i. Individual is 2-80 years of age at time of enrollment.
ii. Subject has a clinical diagnosis of type 1 or type 2 diabetes.
iii. If subject is 14-80 years of age, subject has a clinical diagnosis of type 1 or type 2 diabetes for a minimum of 6 months duration as determined via medical record/ source documentation by an individual qualified to make a medical diagnosis.
iv. If subject is 2-13 years of age, subject has a clinical diagnosis of type 1 or type 2 diabetes as determined via medical record/ source documentation by an individual qualified to make a medical diagnosis.
v. If subject is participating in a YSI-FST, subject has adequate venous access as assessed by investigator or appropriate staff.
vi. Subjects participating in the high and low glucose challenges must have an insulin carbohydrates ratio(s) and insulin sensitivity factor(s). Subjects without ratios may participate under observation only.

***Exclusion Criteria***

i. Subject will not tolerate tape adhesive in the area of sensor placement as assessed by a qualified individual.
ii. Subject has any unresolved adverse skin condition in the area of sensor or device placement (e.g., psoriasis, rash, *Staphylococcus* infection).
iii. Subject is actively participating in an investigational study (e.g., drug or device) wherein he/she has received treatment from an investigational study (drug or device) in the last 2 weeks prior to Visit 1. (Please note participation in an observational study is acceptable.)
iv. Subject is female of child-bearing potential and has a pregnancy screening test that is positive.
v. Subject is a sexually active female of childbearing potential and is not using a form of contraception deemed reliable by the investigator.
vi. Subject is female and plans to become pregnant during the course of the study.
vii. Subject has had a hypoglycemic seizure within the past 6 months prior to enrollment.

viii. Subject has had hypoglycemia resulting in loss of consciousness within the past 6 months prior to enrollment.
ix. Subject has had an episode of diabetic ketoacidosis (DKA) within the past 6 months prior to enrollment.
x. Subject has a history of a seizure disorder.
xi. Subject has central nervous system or cardiac disorder resulting in syncope.
xii. Subject has a history of myocardial infarction, unstable angina, coronary artery bypass surgery, coronary artery stenting, transient ischemic attack (TIA), cerebrovascular accident (CVA), angina, congestive heart failure, ventricular rhythm disturbances or thromboembolic disease
xiii. If subject is 7-80 years of age, subject has a hematocrit (Hct) more than 10% below the lower limit of normal reference range (please note that patients may use prior blood draw from routine care as long as the blood draw is within 6 months of screening and report of lab included with subject source documents).
xiv. Subject has a history of adrenal insufficiency.
xv. Subject is a member of the research staff involved with the study.

2. Follow-up Schedule

Subjects ages 14–80 years were scheduled to make 12 visits to the clinical study site, including the Enrollment/Screening visit (visit 1) and Study and device training (visit 2). Whereas, subjects ages 2-13 years were scheduled to make 8 visits to the clinical study site, including the Enrollment/Screening visit (visit 1) and Study and device training (visit 2). Subjects wore the devices up to 7-day Training Period, followed by a 7-day Study Period. In the event that early sensor removal occurs during the Training Period, the subject could continue to the Study Period based on PI discretion.

During the study period, subjects (ages 14–80 years) underwent 4 days of YSI FSTs, each FST was approximately 8 hours during the in-clinic visit. Whereas, subjects (ages 7-13 years) underwent 2 days of YSI FST, each approximately 6 hours during the in-clinic visit. During the YSI FST, venous blood samples were drawn every 5-15 minutes and analyzed using the YSI. Study subjects ages 2-6 years underwent 2 days of SMBG FSTs, each were approximately 4 hours during the in-clinic visit. The frequency of blood draws with SMBG was every 5 – 30 minutes.

3. Clinical Endpoints

The primary endpoint of the Accuracy Study was as follows:

For accuracy with Athena Plus algorithm the Simplera Sync values were compared to YSI plasma glucose values during YSI FSTs. A within 20% mean agreement rate

(±20 mg/dL when SG less than (<) 80 mg/dL), μ, between Simplera Sync values and YSI plasma glucose values during YSI FST days was evaluated against the null hypothesis.

The secondary endpoints were evaluated in a fixed sequence of testing for adjustment of multiplicity. The results were compared to the iCGM Special Control criteria for sensor accuracy (SG limit of 50-400 mg/dL [2.8-22.2 mmol/L]).

## B. Accountability of PMA Cohort

A total of 96 subjects 7-17 years of age were enrolled in the study; a total of 7 subjects discontinued during the course of the study.

## C. Study Population Demographics and Baseline Parameters

Table 16 provides a high-level summary of the population demographics for subjects 7-80 years of age, the indication Medtronic seeks to commercialize.

*Table 16. Simplera Sync pivotal study Population Demographics*

| Characteristic | Subjects 7–17 years of age Number of Subjects =95[a] |
|---|---|
| **Age (Years)** | |
| n | 95 |
| Mean (SD) | 13.1 (3.2) |
| Median | 14.0 |
| Min, max | 7.0, 17.0 |
| **Gender N (%)** | |
| Female | 43 (45.3%) |
| Male | 52 (54.7%) |
| **Race N (%)** | |
| Asian | 1 (1.1%) |
| Black or African American | 7 (7.4%) |
| Native Hawaiian / Other Pacific Islander | None |
| White | 85 (89.5%) |
| Other race | 1 (1.1%) |
| American Indian or Alaska Native | None |
| Asian, White | 1 (1.1%) |
| **Ethnicity N (%)** | |
| Hispanic or Latino | 7 (7.4%) |

| Characteristic | Subjects 7–17 years of age Number of Subjects =95[a] |
|---|---|
| Not Hispanic or Latino | 87 (91.6%) |
| Unknown | 1 (1.1%) |
| **Diabetes Type (%)** | |
| Type 1 insulin requiring | 94 (98.9%) |
| Type 2 insulin requiring | None |
| Type 2 non-insulin requiring | 1 (1.1%) |
| **Diabetes History (Years)** | |
| n | 95 |
| Mean (SD) | 6.5 (3.8) |
| Median | 6.3 |
| Min, max | 0.5, 15.0 |
| **Height (cm)** | |
| n | 95 |
| Mean (SD) | 158.7 (17.0) |
| Median | 162.5 |
| Min, max | 119.0, 193.5 |
| **Weight (kg)** | |
| n | 95 |
| Mean (SD) | 54.6 (18.0) |
| Median | 53.5 |
| Min, max | 20.4, 98.5 |
| **Body Mass Index (BMI) (kg/m2)** | |
| n | 95 |
| Mean (SD) | 21.1 (4.5) |
| Median | 20.2 |
| Min, max | 14.4, 39.8 |
| **Baseline A1C (%)** | |
| n | 95 |
| Mean (SD) | 8.2 (1.4) |
| Median | 8.0 |
| Min, max | 5.7, 12.5 |
| **Total Daily Dose[b] (Units)** | |
| n | 94 |
| Mean (SD) | 50 (26.7) |
| Median | 46 |

| Characteristic | Subjects 7–17 years of age<br>Number of<br>Subjects =95[a] |
|---|---|
| Min, max | 6, 195 |
| **CGM Experience** | |
| CGM experienced | 91 (95.8%) |
| CGM naïve | 4 (4.2%) |
| **Pump Experience** | |
| Pump experienced | 80 (84.2%) |
| Pump naïve | 15 (15.8%) |

a. Excludes 1 subject who was a screen failure
b. Only subjects requiring insulin were included in the TDD analysis

## D. Safety and Effectiveness Results

The safety was assessed by evaluation of the incidence of all serious Adverse Events, Adverse Device Effects (ADEs), Serious Adverse Device Events (SADEs), and Unanticipated Adverse Device Effects (UADEs) experienced by study subjects in addition to the skin assessments.

1. Safety Results

   Adverse events (AEs) were listed in terms of severity and relationship to the device. There were no device-related or procedure-related serious adverse events, or unanticipated adverse device effects after seven days of use.

   A total of 16 adverse events (AEs) were reported from all investigational sites for 7–17-year-old study subjects enrolled in the study. Out of 16 events, three were device related and four were procedure related. There was one incidence of severe hyperglycemia, which was not device related. There were no reports of severe hypoglycemia or diabetic ketoacidosis.

   The majority of skin observations were related to observations at the insertion site, including red and pink dots, raised areas around insertion, raised bump, and a drop of blood at the insertion site. The severity of these observations was predominately mild. One occurrence of bruising at the insertion/application area was characterized as moderate (≥ 6cm).

2. Effectiveness Results

   Data collected during the study was post-processed after the study using the Athena Plus zero-calibration algorithm to convert the raw sensor information to sensor

glucose values every five minutes. For the accuracy information presented in the following section, the laboratory-based comparator method (CM) using the YSI 2300 Analyzer was used. The comparator values were paired with the closest sensor glucose reading within five minutes of the time of the reference value measurement.

*Table 11: Overall Accuracy Compared to Comparator Method (CM)*

| Patient Population | Insertion Site | Number of Subjects | Number of paired SG-CM | Percent of SG within 20/20% of CM | Mean Absolute Relative Difference (%) |
|---|---|---|---|---|---|
| Pediatrics (7-17) | Arm | 89 | 8282 | 89.0 | 10.8 |

For 20% agreement, ±20 mg/dL was used when CM was <70 mg/dL

In Table 18 below, the agreement of the SG values to paired CM values was assessed by calculating the percentage of SG values that were within 15%, 20%, and 40% of the paired CM values. For SG readings less than 70 mg/dL, the absolute difference in mg/dL between the SG and paired CM values was calculated.

*Table 128: Overall accuracy of CGM-CM paired points within CGM ranges; Pediatrics (7-17 years), Arm*

| CGM Glucose Range (mg/dL) | Number of Subjects | Number of paired CGM-CM | Percent of SG within 15 mg/dL CM | Percent of SG within 20 mg/dL CM | Percent of SG within 40 mg/dL CM | Percent of SG within 15% CM | Percent of SG within 20% CM | Percent of SG within 40% CM | Bias (mg/dL) | MARD (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| <54 mg/dL | 22 | 91 | 90.1 | 97.8 | 100.0 | | | | ⁻5.7 | 11.2 |
| 54-69 mg/dL | 49 | 941 | 94.0 | 97.3 | 99.8 | | | | ⁻1.1 | 9.5 |
| 70-180 mg/dL | 88 | 4484 | | | | 68.4 | 79.9 | 96.9 | ⁻4.4 | 12.8 |
| 181-250 mg/dL | 87 | 1547 | | | | 83.3 | 92.5 | 99.3 | ⁻11.5 | 8.8 |
| >250 mg/dL | 73 | 1219 | | | | 91.3 | 97.0 | 100.0 | ⁻14.4 | 7.1 |

For 15%, 20% and 40% agreement, ±15, ±20, and ±40 mg/dL used when CGM <70 mg/dL.

**Agreement when CGM reads "Below 50 mg/dL" or "Above 400 mg/dL"**

The real-time CGM systems display glucose values between 50 mg/dL and 400 mg/dL. It displays "Below 50 mg/dL" when the SG value detected is below 50 mg/dL. It displays "Above 400 mg/dL" when the SG value detected is above 400 mg/dL. Table 20 and Table 21 illustrate the number and percentage of the paired CM values in different blood glucose levels when the CGM system displays "Below 50 mg/dL" (LOW) or "Above 400 mg/dL" (HIGH).

*Table 19: Number and Percentage of CGM Readings 'Below 50 mg/dL' (LOW) Compared to CM, Subjects 7–17 Years of Age*

| CGM Reading | CGM-CM Pairs | CM (mg/dL) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **<55** | **<60** | **<70** | **<80** | **≥80** | **Total** |
| LOW | Cumulative, n | 72 | 100 | 112 | 114 | 0 | 114 |
| | Cumulative % | 63% | 88% | 98% | 100% | 0% | -- |

*Table 20: Number and percentage of CGM Readings 'Above 400 mg/dL' (HIGH) Compared to CM, Subjects 7–17 Years of Age*

| CGM Reading | CGM-CM Pairs | CM (mg/dL) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **>340** | **>320** | **>280** | **>240** | **≤240** | **Total** |
| HIGH | Cumulative, n | 9 | 9 | 9 | 9 | 0 | 9 |
| | Cumulative % | 100% | 100% | 100% | 100% | 0% | -- |

**Concurrence of SG and CM values**

The following tables show, for each SG range, the percentage of concurring data points where the paired CM values were in different blood glucose ranges.

*Table 21: Overall Concurrence of CM® Values and CGM Readings, Subjects 7–17 Years of Age*

| CGM Glucose Ranges (mg/dL) | Percent of Matched Pairs-in Each CM Glucose Range for Each CGM Glucose Range | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CM (mg/dL) | | | | | | | | | | | | |
| | Number of Subjects | Number of Paired CGM-CM | <50 | ≥50-60 | >60-80 | >80-120 | >120-160 | >160-200 | >200-250 | >250-300 | >300-350 | >350-400 | >400 |
| <50 | 17 | 114 | 36.8% (42/114) | 50.9% (58/114) | 12.3% (14/114) | 0.0% (0/114) | 0.0% (0/114) | 0.0% (0/114) | 0.0% (0/114) | 0.0% (0/114) | 0.0% (0/114) | 0.0% (0/114) | 0.0% (0/114) |
| >=50-60 | 38 | 388 | 7.0% (27/388) | 49.0% (190/388) | 42.3% (164/388) | 1.8% (7/388) | 0.0% (0/388) | 0.0% (0/388) | 0.0% (0/388) | 0.0% (0/388) | 0.0% (0/388) | 0.0% (0/388) | 0.0% (0/388) |
| >60-80 | 62 | 1382 | 0.4% (5/1382) | 15.6% (215/ 1382) | 69.2% (957/ 1382) | 14.1% (195/ 1382) | 0.7% (9/1382) | 0.0% (0/1382) | 0.0% (0/1382) | 0.1% (1/1382) | 0.0% (0/1382) | 0.0% (0/1382) | 0.0% (0/1382) |
| >80-120 | 82 | 1705 | 0.2% (3/1705) | 0.9% (16/1705) | 18.3% (312/ 1705) | 60.5% (1031/ 1705) | 17.8% (304/ 1705) | 2.1% (36/1705) | 0.0% (0/1705) | 0.1% (1/1705) | 0.1% (2/1705) | 0.0% (0/1705) | 0.0% (0/1705) |
| >120-160 | 86 | 1398 | 0.0% (0/1398) | 0.0% (0/1398) | 0.4% (5/1398) | 11.1% (155/ 1398) | 62.7% (876/ 1398) | 23.0% (322/ 1398) | 2.2% (31/1398) | 0.4% (6/1398) | 0.1% (2/1398) | 0.1% (1/1398) | 0.0% (0/1398) |
| >160-200 | 86 | 1170 | 0.0% (0/1170) | 0.0% (0/1170) | 0.0% (0/1170) | 0.3% (4/1170) | 13.3% (156/ 1170) | 56.5% (661/ 1170) | 27.4% (320/ 1170) | 1.1% (13/1170) | 0.9% (10/1170) | 0.3% (4/1170) | 0.2% (2/1170) |
| >200-250 | 83 | 1020 | 0.0% (0/1020) | 0.0% (0/1020) | 0.0% (0/1020) | 0.1% (1/1020) | 0.7% (7/1020) | 8.6% (88/1020) | 62.8% (641/ 1020) | 25.2% (257/ 1020) | 2.5% (26/1020) | 0.0% (0/1020) | 0.0% (0/1020) |
| >250-300 | 73 | 706 | 0.0% (0/706) | 0.0% (0/706) | 0.0% (0/706) | 0.0% (0/706) | 0.0% (0/706) | 0.1% (1/706) | 9.2% (65/706) | 58.2% (411/706) | 29.9% (211/706) | 2.5% (18/706) | 0.0% (0/706) |
| >300-350 | 51 | 424 | 0.0% (0/424) | 0.0% (0/424) | 0.0% (0/424) | 0.0% (0/424) | 0.0% (0/424) | 0.0% (0/424) | 0.2% (1/424) | 9.4% (40/424) | 59.7% (253/424) | 29.7% (126/424) | 0.9% (4/424) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| >350-400 | 23 | 89 | 0.0% (0/89) | 0.0% (0/89) | 0.0% (0/89) | 0.0% (0/89) | 0.0% (0/89) | 0.0% (0/89) | 0.0% (0/89) | 0.0% (0/89) | 6.7% (6/89) | 67.4% (60/89) | 25.8% (23/89) |
| >400 | 3 | 9 | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 0.0% (0/9) | 22.2% (2/9) | 77.8% (7/9) |

**Trend Accuracy**

A summary of the Simplera Sync trend accuracy in the adult and pediatric populations with the arm insertion location is shown in the following tables. The top right and bottom left corners of the table represent the areas where there is the most incongruence between the SG rate of change and the CM rate of change.

*Table 22: Concurrence of CGM Readings and CM Values Stratified by Different CGM Rate Ranges, Subjects 7–17 years of Age*

| CGM Rate Ranges (mg/dL/min) | Percent of Matched Pairs-in Each CM Rate Range for Each CGM Rate Range | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CM (mg/dL/min) | | | | | | | |
| | Number of Subjects | Number of Paired CGM-CM | <-2 | [-2, -1) | [-1, 0) | [0, 1] | (1, 2] | >2 |
| <-2 | 58 | 158 | 44.9% (71/158) | 46.2% (73/158) | 8.9% (14/158) | 0.0% (0/158) | 0.0% (0/158) | 0.0% (0/158) |
| [−2, −1) | 86 | 756 | 5.3% (40/756) | 58.3% (441/756) | 33.9% (256/756) | 2.2% (17/756) | 0.1% (1/756) | 0.1% (1/756) |
| [−1, 0) | 89 | 3507 | 0.5% (17/3507) | 6.9% (243/3507) | 74.5% (2612/3507) | 17.5% (615/3507) | 0.5% (19/3507) | 0.0% (1/3507) |
| [0, 1] | 89 | 2769 | 0.0% (1/2769) | 1.0% (27/2769) | 21.1% (584/2769) | 69.2% (1915/2769) | 7.9% (218/2769) | 0.9% (24/2769) |
| (1, 2] | 88 | 801 | 0.1% (1/801) | 0.5% (4/801) | 1.9% (15/801) | 29.5% (236/801) | 57.7% (462/801) | 10.4% (83/801) |
| >2 | 71 | 283 | 0.0% (0/283) | 0.4% (1/283) | 0.7% (2/283) | 4.6% (13/283) | 30.0% (85/283) | 64.3% (182/283) |

**Sensor Accuracy Over Time**

A summary of the Simplera Sync sensor stability and accuracy over time throughout early-wear, mid-wear, and late wear in the adult population with the arm insertion site is shown in the tables below.

*Table 23: Sensor Stability Relative to CM (Accuracy Over Time); Subjects 7–17 Years of Age*

| Sensor Wear Period[a] | Number of Subjects | Number of Paired CGM-CM | MARD (%) | Percent of SG Within 15/15% CM (%)[b] | Percent of SG Within 20/20% CM (%)[b] | Percent of SG Within 40/40% CM (%)[b] |
|---|---|---|---|---|---|---|
| Beginning | 73 | 2452 | 13.1 | 70.8 | 84.2 | 98.5 |
| Middle | 78 | 4337 | 9.7 | 82.4 | 91.5 | 98.8 |
| End | 57 | 1493 | 10.1 | 83.1 | 89.7 | 98.7 |

a. The wear period was defined as: beginning (Elapsed day 1, 2), middle (Elapsed day 3, 4, 5), and end (Elapsed day 6, 7).
b. For 15%, 20% and 40% agreement, ±15, ±20, and ±40 mg/dL was used when CM was <70 mg/dL.

**Pump Alert Performance with 780G System with Simplera Sync**

Alert performance was evaluated to obtain 'true alert' and 'false alert' rates, and 'correctly detected' and 'missed detection' rates. The descriptions and Table 24 – Table 27 below describe the alert rate performance of the device within this clinical study. The true alert rate is the rate at which the blood glucose value confirmed that the continuous glucose monitor alert was triggered correctly. The default threshold alerts are highlighted in gray in the tables below. For example:

- True Threshold Hypoglycemic alert rate alerted when the continuous glucose monitor read that the user was below the low threshold and the user's blood glucose was actually below that low threshold (within +/- 15 or 30 minutes of the alert)
- True Threshold Hyperglycemic alert rate alerted when the continuous glucose monitor read that the user was above the high threshold and the user's blood glucose was actually above that high threshold (within +/- 15 or 30 minutes of the alert)
- True Predictive Hypoglycemic alert rate alerted when the continuous glucose monitor predicted that the user would reach below the low threshold and the user's blood glucose was actually below that low threshold within 15 or 30 minutes following the alert
- True Predictive Hyperglycemic alert rate alerted when the continuous glucose monitor predicted that the user would reach above the high threshold and the user's blood glucose was actually above that high threshold within 15 or 30 minutes following the alert.

*Table 24: Glucose True Alert Performance, Athena Plus Zero Calibration, Pediatrics (7-17 years)*

| mg/dL | Threshold Only | | Predictive Only | | Threshold and Predictive | |
|---|---|---|---|---|---|---|
| | ±30 min | ±15 min | ±30 min | ±15 min | ±30 min | ±15 min |
| 63 | 67.1% (57/85) | 67.1% (57/85) | 48.0% (82/171) | 39.8% (68/171) | 54.3% (139/256) | 48.8% (125/256) |
| 65 | 73.3% (66/90) | 72.2% (65/90) | 49.2% (87/177) | 42.9% (76/177) | 57.3% (153/267) | 52.8% (141/267) |
| 70 | 75.7% (81/107) | 74.8% (80/107) | 54.2% (109/201) | 50.2% (101/201) | 61.7% (190/308) | 58.8% (181/308) |
| 80 | 71.9% (110/153) | 71.2% (109/153) | 55.7% (132/237) | 52.7% (125/237) | 62.1% (242/390) | 60.0% (234/390) |
| 90 | 76.5% (137/179) | 76.0% (136/179) | 62.1% (164/264) | 59.5% (157/264) | 67.9% (301/443) | 66.1% (293/443) |
| 180 | 89.5% (263/294) | 89.1% (262/294) | 73.2% (303/414) | 69.8% (289/414) | 79.9% (566/708) | 77.8% (551/708) |
| 220 | 93.9% (200/213) | 93.4% (199/213) | 68.6% (240/350) | 65.4% (229/350) | 78.2% (440/563) | 76.0% (428/563) |
| 250 | 90.3% (149/165) | 89.7% (148/165) | 63.8% (185/290) | 59.0% (171/290) | 73.4% (334/455) | 70.1% (319/455) |
| 300 | 89.7% (87/97) | 89.7% (87/97) | 57.2% (103/180) | 55.0% (99/180) | 68.6% (190/277) | 67.1% (186/277) |

**Glucose False Alert Rates**

The glucose false alert rate is the rate at which the blood glucose value did not confirm that the continuous glucose monitor alert was triggered correctly. For example:

- False Threshold Hypoglycemic alert rate the alarm alerted when the continuous glucose monitor read that the user was below the low threshold but the users blood glucose was actually above that low threshold (within +/- 15 or 30 minutes of the alert).
- False Threshold Hyperglycemic alert rate the alarm alerted when the continuous glucose monitor read that the user was above the high threshold but the user's blood glucose was actually below that high threshold (within +/- 15 or 30 minutes of the alert).
- False Predictive Hypoglycemic alert rate the alarm alerted when the continuous glucose monitor predicted that the user would be below the low threshold but the user's blood glucose was actually above that low threshold within 15 or 30 minutes following the alert.
- False Predictive Hyperglycemic alert rate the alarm alerted when the continuous glucose monitor predicted that the user would be above the

high threshold but the user's blood glucose was actually below the high threshold within 15 or 30 minutes following the alert.

*Table 25: Glucose False Alert Performance, Athena Plus Zero Calibration, Pediatrics (7-17 years)*

| mg/dL | Threshold Only | | Predictive Only | | Threshold and Predictive | |
|---|---|---|---|---|---|---|
| | ±30 min | ±15 min | ±30 min | ±15 min | ±30 min | ±15 min |
| 63 | 32.9% (28/85) | 32.9% (28/85) | 52.0% (89/171) | 60.2% (103/171) | 45.7% (117/256) | 51.2% (131/256) |
| 65 | 26.7% (24/90) | 27.8% (25/90) | 50.8% (90/177) | 57.1% (101/177) | 42.7% (114/267) | 47.2% (126/267) |
| 70 | 24.3% (26/107) | 25.2% (27/107) | 45.8% (92/201) | 49.8% (100/201) | 38.3% (118/308) | 41.2% (127/308) |
| 80 | 28.1% (43/153) | 28.8% (44/153) | 44.3% (105/237) | 47.3% (112/237) | 37.9% (148/390) | 40.0% (156/390) |
| 90 | 23.5% (42/179) | 24.0% (43/179) | 37.9% (100/264) | 40.5% (107/264) | 32.1% (142/443) | 33.9% (150/443) |
| 180 | 10.5% (31/294) | 10.9% (32/294) | 26.8% (111/414) | 30.2% (125/414) | 20.1% (142/708) | 22.2% (157/708) |
| 220 | 6.1% (13/213) | 6.6% (14/213) | 31.4% (110/350) | 34.6% (121/350) | 21.8% (123/563) | 24.0% (135/563) |
| 250 | 9.7% (16/165) | 10.3% (17/165) | 36.2% (105/290) | 41.0% (119/290) | 26.6% (121/455) | 29.9% (136/455) |
| 300 | 10.3% (10/97) | 10.3% (10/97) | 42.8% (77/180) | 45.0% (81/180) | 31.4% (87/277) | 32.9% (91/277) |

**Glucose Correct Detection Rates**

Glucose Correct Detection Rate is the rate that the device alerted when it should have alerted. For example, the blood glucose was below the hypoglycemic threshold, or above the hyperglycemic threshold, and the device sounded an alert (within +/- 15 or 30 minutes for the threshold alerts, and within 15 or 30 minutes following predictive alerts).

*Table 26: Glucose Correct Detection Alert Performance, Athena Plus Zero Calibration, Pediatrics (7-17 years)*

| mg/dL | Threshold Only | | Predictive Only | | Threshold and Predictive | |
|---|---|---|---|---|---|---|
| | ±30 min | ±15 min | ±30 min | ±15 min | ±30 min | ±15 min |
| 63 | 65.9% (56/85) | 64.7% (55/85) | 84.7% (72/85) | 77.6% (66/85) | 84.7% (72/85) | 78.8% (67/85) |

| mg/dL | Threshold Only | | Predictive Only | | Threshold and Predictive | |
|---|---|---|---|---|---|---|
| | ±30 min | ±15 min | ±30 min | ±15 min | ±30 min | ±15 min |
| 65 | 71.9% (64/89) | 70.8% (63/89) | 91.0% (81/89) | 82.0% (73/89) | 91.0% (81/89) | 83.1% (74/89) |
| 70 | 80.0% (80/100) | 79.0% (79/100) | 95.0% (95/100) | 92.0% (92/100) | 95.0% (95/100) | 93.0% (93/100) |
| 80 | 92.0% (115/125) | 91.2% (114/125) | 97.6% (122/125) | 96.0% (120/125) | 97.6% (122/125) | 96.8% (121/125) |
| 90 | 87.4% (139/159) | 86.8% (138/159) | 96.9% (154/159) | 93.7% (149/159) | 96.9% (154/159) | 95.6% (152/159) |
| 180 | 93.7% (282/301) | 91.7% (276/301) | 96.7% (291/301) | 93.4% (281/301) | 97.3% (293/301) | 96.7% (291/301) |
| 220 | 90.7% (214/236) | 89.8% (212/236) | 96.6% (228/236) | 94.9% (224/236) | 96.6% (228/236) | 95.3% (225/236) |
| 250 | 86.9% (159/183) | 85.8% (157/183) | 95.6% (175/183) | 94.0% (172/183) | 95.6% (175/183) | 95.1% (174/183) |
| 300 | 82.1% (92/112) | 81.3% (91/112) | 89.3% (100/112) | 84.8% (95/112) | 90.2% (101/112) | 88.4% (99/112) |

**Glucose Missed Detection Rates**

The Missed Detection Rate is the rate that the device did not alert when it should have (within +/- 15 or 30 minutes for the threshold alerts, and within 15 or 30 minutes following predictive alerts). For example, the blood glucose was below the hypoglycemic threshold, or above the hyperglycemic threshold, and the device did not sound a threshold or predictive alert.

*Table 27: Glucose Missed Detection Alert Performance, Athena Plus Zero Calibration, Pediatrics (7-17 years)*

| mg/dL | Threshold Only | | Predictive Only | | Threshold and Predictive | |
|---|---|---|---|---|---|---|
| | ±30 min | ±15 min | ±30 min | ±15 min | ±30 min | ±15 min |
| 63 | 34.1% (29/85) | 35.3% (30/85) | 15.3% (13/85) | 22.4% (19/85) | 15.3% (13/85) | 21.2% (18/85) |
| 65 | 28.1% (25/89) | 29.2% (26/89) | 9.0% (8/89) | 18.0% (16/89) | 9.0% (8/89) | 16.9% (15/89) |
| 70 | 20.0% (20/100) | 21.0% (21/100) | 5.0% (5/100) | 8.0% (8/100) | 5.0% (5/100) | 7.0% (7/100) |
| 80 | 8.0% (10/125) | 8.8% (11/125) | 2.4% (3/125) | 4.0% (5/125) | 2.4% (3/125) | 3.2% (4/125) |

| mg/dL | Threshold Only | | Predictive Only | | Threshold and Predictive | |
|---|---|---|---|---|---|---|
| | ±30 min | ±15 min | ±30 min | ±15 min | ±30 min | ±15 min |
| 90 | 12.6% (20/159) | 13.2% (21/159) | 3.1% (5/159) | 6.3% (10/159) | 3.1% (5/159) | 4.4% (7/159) |
| 180 | 6.3% (19/301) | 8.3% (25/301) | 3.3% (10/301) | 6.6% (20/301) | 2.7% (8/301) | 3.3% (10/301) |
| 220 | 9.3% (22/236) | 10.2% (24/236) | 3.4% (8/236) | 5.1% (12/236) | 3.4% (8/236) | 4.7% (11/236) |
| 250 | 13.1% (24/183) | 14.2% (26/183) | 4.4% (8/183) | 6.0% (11/183) | 4.4% (8/183) | 4.9% (9/183) |
| 300 | 17.9% (20/112) | 18.8% (21/112) | 10.7% (12/112) | 15.2% (17/112) | 9.8% (11/112) | 11.6% (13/112) |

**Sensor Life**

***Simplera Sync Sensor Survival Analysis 7-17 years of age***

Among the 99 sensors evaluated, 8 sensors (8.1%) were censored from the survival analysis due to various reasons not related to the commercial device (e.g., subject dropped out of the study, subject accidentally removed sensors at the incorrect time, or software anomalies that are only applicable to the investigational device but resolved for the commercial device), 66.2% of the sensors lasted through the end of the entire six-day wear period, and 47.5% lasted through the end of the six-day wear period followed by a grace period of 24 hours.

**Precision Analysis**

Precision of the System was evaluated by comparing the results from two separate sensors worn in the location on the same subject at the same time. The following table provides the summary of a precision analysis.

*Table 13: Summary of Precision*

| Age | Number of paired points | Paired Absolute Relative Difference (PARD [%CV]) |
|---|---|---|
| **7-17 years old** | 9723 | 8.2 (5.9) |

3. Pediatric Extrapolation

As described above in section A. Study Design, the clinical data include pediatrics down to 7 years of age. Therefore, other existing pediatric data was not leveraged.

## XI. FINANCIAL DISCLOSURE

The Financial Disclosure by Clinical Investigators regulation (21 CFR 54) requires applicants who submit a marketing application to include certain information concerning the compensation to, and financial interests and arrangement of, any clinical investigator conducting clinical studies covered by the regulation.

The Safety and Effectiveness Evaluation of the MiniMed™ 780G System Used in Combination with the Simplera Sync CGM (CIP337) pivotal study (G220306) included 24 investigators. The following clinical investigators had disclosable financial interests/arrangements as defined in sections 54.2(a), (b), (c), and (f).

- Gregory Forlenza
- Dorothy Shulman

The sensor performance study (**G200156**) included 13 principal investigators. None of the clinical investigator had disclosable financial interests/arrangements as defined in sections 54.2(a), (b), (c), and (f).

The applicant has adequately disclosed the financial interest/arrangements with clinical investigators. Statistical analyses were conducted by FDA to determine whether the financial interests/arrangements had any impact on the clinical study outcome. The information provided does not raise any questions about the reliability of the data.

## XII. SUMMARY OF SUPPLEMENTAL CLINICAL INFORMATION

Real world evidence (RWE) from outside of the United States (OUS) of the MiniMed 780G system used with the Simplera Sync and Guardian 4 Sensor was considered in this review.

## XIII. PANEL MEETING RECOMMENDATION AND FDA'S POST-PANEL ACTION

In accordance with the provisions of section 515(c)(2) of the act as amended by the Safe Medical Devices Act of 1990, this PMA was not referred to the Clinical Chemistry and Clinical Toxicology Devices Panel, an FDA advisory committee, for review and recommendation because the information in the PMA substantially duplicates information previously reviewed by this panel.

## XIV. CONCLUSIONS DRAWN FROM PRECLINICAL AND CLINICAL STUDIES

### A. Effectiveness Conclusions

The results of the clinical studies performed to support this submission establish a reasonable assurance of effectiveness that the MiniMed 780G system, with either Simplera Sync or Guardian 4 sensor, can automatically adjust basal insulin rates and calculate and deliver auto correction boluses based on CGM values.

Additionally, a reasonable assurance has been demonstrated that the system can detect trends and track patterns and temporarily suspend and resume delivery of insulin when used as intended, as an adjunct to blood glucose testing, when used with Simplera Sync or Guardian 4 sensor, in subjects with type 1 diabetes mellitus.

The effectiveness of the Guardian 4 sensor component was based on the evaluation of performance of the MiniMed 780G system used with the Simplera Sync and Guardian 4 Sensor obtained from real world evidence (RWE) from outside of the United States (OUS). The evaluation of the performance concluded that the system works equivalently with both sensors, and therefore supports the use of the Guardian 4 Sensor in the current configuration of the MiniMed 780G system.

### B. Safety Conclusions

An understanding of the risks of the device are based on nonclinical laboratory data as well as on data collected in the clinical studies conducted to support PMA approval that are described above.

The following events are possible adverse device effects of inserting a sensor into your skin: local infection, inflammation, pain or discomfort, bleeding at the glucose sensor insertion site, bruising, itching, scarring or skin discoloration, hematoma, tape irritation, sensor or needle fracture during insertion, wear, or removal.

Potential device related non serious events include:

- Skin Irritation or redness
- Infection
- Pain or discomfort
- Bruising
- Edema
- Rash
- Bleeding
- Induration of skin

- Allergic reaction to adhesives
- Hyperglycemia following inadequate or suspension of insulin delivery (which can result from catheter occlusion, hardware or software malfunction, or erroneous CGM readings)
- Ketosis following inadequate or suspension of insulin delivery (which can result from catheter occlusion, hardware or software malfunction, or erroneous CGM readings)
- Hypoglycemia resulting from insulin over-delivery (which can result from catheter occlusion, hardware or software malfunction, or erroneous CGM readings)

Sensor breakage with fragments retained under the skin is a potential adverse event related to use of the CGM component of the system, but this was not observed during these studies. Based on post-market experience with similar devices, the occurrence and severity of these events do not raise major concerns.

Infection at the insulin pump infusion set insertion site and sensor insertion site is a potential complication related to insertion of the CGM or the insulin pump infusion set. Based on post-market experience with similar devices, the occurrence and severity of these events are not expected to be different from other approved infusion sets and CGM devices, and so do not pose an unreasonable risk.

The CGM readings (together with blood glucose meter readings) are used by the system to determine automated insulin delivery, including insulin suspension and insulin dosing, and are the basis for alerts for hypoglycemia and hyperglycemia. While in manual mode, readings from the Simplera Sync sensor and Guardian 4 sensor are intended to be used adjunctively (i.e., confirmatory blood glucose meter readings should be used for diabetes treatment decisions) for tracking and trending of blood sugars.

The consequences of a false positive (falsely high) glucose reading on the continuous glucose meter would be potential over-delivery of insulin via automated insulin delivery, which has the potential to lead to severe hypoglycemia or even death. The consequences of a false negative (falsely low) glucose reading on the continuous glucose meter would be potential under-delivery of insulin, which has the potential to lead to severe hyperglycemia or DKA.

A confirmatory blood glucose meter reading has the potential to mitigate some of the risk of falsely high or falsely low glucose sensor readings, as the patient could choose to override the settings of the system in some cases (i.e., decline to take additional bolus of insulin as recommended by the system in setting of falsely high continuous glucose reading or exit Auto Mode).

## C. Benefit-Risk Determination

Summary of Benefits

**MiniMed 780G System with Simplera Sync**

With use of the 780G System with the Simplera Sync Sensor as the glucose input, the pivotal clinical study (G220306) reported overall findings of improved CGM metrics compared to baseline - time in range (70-180 mg/dL), time below range and time above range, as well as a decrease in HbA1c, compared to baseline. These trends were noted in both the adult (18 years of age and older) as well as the pediatric (7-17 years of age) population. In addition, the pivotal study of the updated 780G with DS5 did not report severe hypoglycemia or DKA related to the system. The Simplera Sync Sensor benefits patients by expanding user access to additional compatible CGMs for the automated insulin delivery (AID) system to manage diabetes and reducing the significant burden on the user who would otherwise have to manage their glucose levels manually. As in several other AID system clinical studies, it is important to note that there are study design limitations (including lack of a dedicated control group, as well as the fact that to date CGM metrics are not validated as surrogate clinical outcomes). The totality of the reported HbA1c, CGM metrics, and patient experience with use of the 780G System with Simplera Sync Sensor are generally thought to be beneficial to patients with the majority of the time spent in SmartGuard mode, which is particularly important to highlight in the labeling to ensure understanding that the attributed benefits are to the system as a whole when operating in SmartGuard mode, with the system in Manual Mode only minimally evaluated in the pivotal study.

**MiniMed 780G System with Guardian 4 Sensor**

The 780G System with Guardian 4 Sensor was previously approved in P160017/S091. In this submission, the AHCL algorithm was updated compared to the AHCL algorithm in the 780G System approved in P160017/S091 and the modifications to the AHCL algorithm design impact the system's performance. The changes to the insulin dosing algorithm generally result in a more aggressive insulin dosing strategy with an increased risk of hypoglycemia. However, the pivotal study (G220306) only used the Simplera Sync Sensor as input to the updated AHCL algorithm and no clinical data has been collected to characterize the performance of the updated 780G System with Guardian 4 Sensor. The applicant presented a simulation study using their Virtual Patient Model as support of the performance of this system with Guardian 4 Sensor. The applicant also provided further analyses of real world evidence (RWE) of performance and safety of the MiniMed 780G system used with the Guardian 4 Sensor from outside of the US (OUS). The RWE provided for the updated 780G system with the G4S confirmed that the reported time below range ( <54 mg/dL), time in range ( 70-180 mg/dL), and time above

range ( >250 mg/dL were generally comparable)to demonstrate the MiniMed 780G system when used with the Simplera Sync sensor.

Summary of Risks

**MiniMed 780G System with Simplera Sync**

Although the earlier version of the 780G AID System has been approved, there are two major changes that impact the risk of this device. First, is the addition of a new sensor, the Simplera Sync CGM. Second, is the incorporation of changes in the AHCL algorithm which are intended to more aggressively administer insulin through increased basal delivery rate and automated bolusing doses.

The Simplera Sync CGM performance was evaluated in a smaller pivotal study in the 7-17 years old comparison to the G4S, which is used as a component of the currently marketed 780G system. The Simplera Sync CGM's evaluation was limited by the lower number of data pairs available for its characterization. Therefore, although the performance of the Simplera Sync has been separately approved for non-adjunctive use for diabetes management in ages 18 and above (P160007/S047), the limited accuracy data in the 7-17 years old population does not support the non-adjunctive use of the Simplera Sync sensor when the 780G system is in Manual Mode (SmartGuard OFF). During the pivotal study of the updated 780G system with the Simplera Sync CGM, the sponsor confirmed that subjects spent minimal time in Manual Mode, and as a result, with minimally interrupted SmartGuard to guide insulin delivery. Therefore, although the performance of the Simplera Sync CGM for non-adjunctive use during periods of Manual Mode when using the update 780G AID system with this sensor in ages 7-13 and 14-17 remains inadequately evaluated, its safety and effectiveness with SmartGuard activated has been adequately supported by the totality of the clinical data provided by the sponsor. The updated 780G within this submission also resulted in a notable increase in weight in a subset of subjects in ages 7-17 with a maximum increase of 20 lbs. over a 13-week study period. Although this weight gain was not observed across the entire cohort ages 7-17, the impact on weight observed with this system should be clearly communicated to users.

**MiniMed 780G System with Guardian 4 Sensor**

No clinical data has been provided to date to characterize the performance of the updated 780G System with Guardian 4 Sensor. The changes to the insulin dosing algorithm generally result int a more aggressive insulin dosing strategy with an increased risk of hypoglycemia. The information to support a reasonable assurance of safety and effectiveness was based on simulation studies and real-world evidence from outside of the US (OUS).

Patient Perspectives

Patient perspectives considered during the review included:

Patients want a variety of devices that provide information and aid in management of their glucose control to inform decision maintaining with their health care providers on lifestyle changes and treatment decisions. Patients have also expressed in conversations with FDA staff, on social media outlets, and at patient centered public conferences that they want devices that provide features that enable automated insulin delivery and are willing to accept reasonable risks related to such devices. This information was gathered via email, during patient-oriented conferences, and face-to-face meetings with patients.

### D. Overall Conclusions

The data in this application support the reasonable assurance of safety and effectiveness of this device when used in accordance with the indications for use.

## XV. CDRH DECISION

CDRH issued an approval order on April 18, 2025.

The applicant's manufacturing facilities have been inspected and found to be in compliance with the device Quality System (QS) regulation (21 CFR 820).

## XVI. APPROVAL SPECIFICATIONS

Directions for use: See device labeling.

Hazards to Health from Use of the Device: See Indications, Contraindications, Warnings, Precautions, and Adverse Events in the device labeling.

Post-approval Requirements and Restrictions: See approval order.

## XVII. REFERENCES

None.