January 3, 2025

Mallinckrodt Manufacturing LLC
Jennifer Brett
Senior Manager, Devices Global Regulatory Affairs
6603 Femrite Drive
Madison, Wisconsin 53718

Re: K242578
Trade/Device Name: EVOLVE Nitric Oxide Delivery System
Regulation Number: 21 CFR 868.5165
Regulation Name: Nitric Oxide Administration Apparatus
Regulatory Class: Class II
Product Code: MRN, MRP, MRQ
Dated: December 6, 2024
Received: December 6, 2024

Dear Jennifer Brett:

We have reviewed your section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (the Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Additional information about changes that may require a new premarket notification are provided in the FDA guidance documents entitled "Deciding When to Submit a 510(k) for a Change to an Existing Device" (https://www.fda.gov/media/99812/download) and "Deciding When to Submit a 510(k) for a Software Change to an Existing Device" (https://www.fda.gov/media/99785/download).

Your device is also subject to, among other requirements, the Quality System (QS) regulation (21 CFR Part 820), which includes, but is not limited to, 21 CFR 820.30, Design controls; 21 CFR 820.90, Nonconforming product; and 21 CFR 820.100, Corrective and preventive action. Please note that regardless of whether a change requires premarket review, the QS regulation requires device manufacturers to review and approve changes to device design and production (21 CFR 820.30 and 21 CFR 820.70) and document changes and approvals in the device master record (21 CFR 820.181).

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR Part 803) for devices or postmarketing safety reporting (21 CFR Part 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR Part 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR Parts 1000-1050.

All medical devices, including Class I and unclassified devices and combination product device constituent parts are required to be in compliance with the final Unique Device Identification System rule ("UDI Rule"). The UDI Rule requires, among other things, that a device bear a unique device identifier (UDI) on its label and package (21 CFR 801.20(a)) unless an exception or alternative applies (21 CFR 801.20(b)) and that the dates on the device label be formatted in accordance with 21 CFR 801.18. The UDI Rule (21 CFR 830.300(a) and 830.320(b)) also requires that certain information be submitted to the Global Unique Device Identification Database (GUDID) (21 CFR Part 830 Subpart E). For additional information on these requirements, please see the UDI System webpage at https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/unique-device-identification-system-udi-system.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-

assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Bradley Q. Quinn -S

Bradley Quinn
Assistant Director
DHT1C: Division of Anesthesia,
Respiratory, and Sleep Devices
OHT1: Office of Ophthalmic, Anesthesia,
Respiratory, ENT, and Dental Devices
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 07/31/2026
See PRA Statement below.

510(k) Number *(if known)*
K242578

Device Name
EVOLVE Nitric Oxide Delivery System

Indications for Use *(Describe)*
The Evolve DS (delivery system) delivers INOMAX® (nitric oxide for inhalation) therapy gas into the inspiratory limb of the patient breathing circuit in a way that provides a constant concentration of nitric oxide (NO), as set by the user, to the patient throughout the inspired breath. It uses a specially designed Injector Module, which enables tracking of the gas delivery system waveforms and the delivery of a synchronized and proportional dose of NO. It may be used with ventilators and respiratory care devices for which the Evolve DS has been validated. The Evolve DS provides continuous integrated monitoring of inspired NO2 and NO with a comprehensive alarm system. The Evolve DS also provides monitoring and alarms for the drug delivery system.

The Evolve DS incorporates a battery that provides up to 4 hours of uninterrupted NO delivery in the absence of external power. The Evolve DS also incorporates an integrated electronic blender that functions as a backup delivery device to provide an adjustable INOmax dose with user supplied oxygen to a manual resuscitator or gas delivery system. The electronic blender incorporates a separate control and delivery pathway that serves as a redundant mechanism for nitric oxide delivery in the event of a main system fault.

The Evolve DS must only be used in accordance with the indications, contraindications, warnings and precautions described in the nitric oxide drug packaging inserts and labeling and is indicated for use in term and near-term (>34weeks gestation) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension. The Evolve DS is indicated for a maximum of 14 days use. The primary targeted clinical setting is the Neonatal Intensive Care Unit (NICU), and secondary targeted clinical setting is the transport of neonates.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

510(K) SUMMARY

In accordance with 21 CFR 807.92 the following summary of information is provided:

Submitter Information

Date:	01 Jan, 2025
Company:	Mallinckrodt Manufacturing, LLC 6603 Femrite Drive Madison, Wisconsin 53718
Contact Person:	Jennifer Brett Senior Manager, Devices Global Regulatory Affairs
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Secondary Contact Person:	David Trueblood Sr. Director, Regulatory Affairs, Devices
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Identification of the Device

Device Trade Name:	EVOLVE Nitric Oxide Delivery System
Common Name:	Nitric Oxide Administration Apparatus (primary) Nitric Oxide Analyzer Nitrogen Dioxide Analyzer
Classification Name:	Apparatus, Nitric Oxide Delivery, or Apparatus, Nitric Oxide Backup Delivery
Device Classification:	Class II – 21 CFR 868.5165
Product Code:	MRN (Primary), MRQ, MRP

Predicate Device(s)	K240410
Description of Device	The EVOLVE Nitric Oxide (NO) Delivery System (DS) is used for administration and monitoring of INOMAX (nitric oxide for inhalation). It is comprised of a main delivery device (EVOLVE), an electronic blender (eINOblender) for backup use, and a Cart which holds the EVOLVE as well as INOMAX drug cylinders, an oxygen cylinder and miscellaneous parts.
Intended Use	The Evolve DS (delivery system) delivers INOMAX® (nitric oxide for inhalation) therapy gas into the inspiratory limb of the patient breathing circuit in a way that provides a constant concentration of nitric oxide (NO), as set by the user, to the patient throughout the inspired breath. It uses a specially designed Injector Module, which enables tracking of the gas delivery system waveforms and the delivery of a synchronized and proportional dose of NO. It may be used with ventilators and respiratory care devices for which the Evolve DS has been validated. The Evolve DS provides continuous integrated monitoring of inspired NO2 and NO with a comprehensive alarm system. The Evolve DS also provides monitoring and alarms for the drug delivery system. The Evolve DS incorporates a battery that provides up to 4 hours of uninterrupted NO delivery in the absence of external power. The Evolve DS also incorporates an integrated electronic blender that functions as a backup delivery device to provide an adjustable INOmax dose with user supplied oxygen to a manual resuscitator or gas delivery system. The electronic blender incorporates a separate control and delivery pathway that serves as a redundant mechanism for nitric oxide delivery in the event of a main system fault. The Evolve DS must only be used in accordance with the indications, contraindications, warnings and precautions described in the nitric oxide drug packaging inserts and labeling and is indicated for use in term and near-term (>34weeks gestation) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension. The Evolve DS is indicated for a maximum of 14 days use. The primary targeted clinical setting is the Neonatal Intensive Care Unit

	(NICU), and secondary targeted clinical setting is the transport of neonates.
Technology	The EVOLVE Nitric Oxide Delivery System utilizes component technology to deliver Nitric Oxide gas to the patient. The components consist of a main delivery device (EVOLVE), an electronic blender (eINOblender) for backup use, and a Cart which holds the EVOLVE as well as INOMAX drug cylinders, an oxygen cylinder and miscellaneous parts. In this revision of the EVOLVE Nitric Oxide Delivery System, the changes to the device includes the labeling for compatibility with respiratory care devices.

Determination of Substantial Equivalence

The modified EVOLVE Nitric Oxide Delivery System has the same intended use as the previously cleared EVOLVE Nitric Oxide Delivery System (K240410). All features are identical except those described in the table below.

Comparison to Predicate Device

Feature / Specification	EVOLVE Nitric Oxide Delivery System K240410	EVOLVE Nitric Oxide Delivery System with additional ventilator and breathing devices
Labeling for compatibility with ventilator devices	A variety of neonatal, adult/ped, high frequency and anesthesia ventilators, nasal CPAP and nasal high flow cannulas.	Additional ventilator devices and breathing devices include: • Airon pNeuton mini • Coviden Newport HT70 Plus • Dräger 3000/3000 plus • Dräger Savina 300 • Fisher & Paykel Healthcare Airvo 3 • GE Healthcare Carescape R860 • GE Healthcare Avance CS^2/Aisys CS^2 • Getinge Servo-air 4.0 • Nihon Kohden NKV-330 • Smiths Medical ParaPAC 200/200D • Vyaire Avea • Vyaire Bellavista 1000/1000e • Vyaire ReVel

Summary of Non-Clinical Tests

In the original EVOLVE Nitric Oxide Delivery System 510(k) [K222930], the Ventilator / Gas Delivery System Validation Test Protocol was accepted, and the outcomes were used as

justification on clearance of the submission. The Ventilator / Gas Delivery System Validation Test Protocol was used to validate the hazards identified from risk input were mitigated. This same protocol was subsequently used for ventilator validations as part of K240410 and this submission. Testing was conducted across all platforms to demonstrate that the EVOLVE Nitric Oxide Delivery System performs within published specifications. Ultimately, the requirements necessary for the operation of the EVOLVE Nitric Oxide Delivery System passed.

Summary of Clinical Tests

This section is not applicable to this submission. The subject of this premarket submission, EVOLVE Nitric Oxide Delivery System with updated labeling to interface with additional ventilator and breathing devices, did not require clinical studies to support substantial equivalence.

Conclusion

Mallinckrodt Manufacturing, LLC considers the EVOLVE Nitric Oxide Delivery System to be as safe and as effective as the predicate device, with performance substantially equivalent to the predicate device.