SPECIAL 510(K): DEVICE MODIFICATION
DECISION SUMMARY

510(k) Number: _K180438___

This 510(k) submission contains information/data on modifications made to the applicant's own class II device requiring 510(k). The following items are present and acceptable:

---

1. The name and 510(k) number of the applicant's previously cleared device.

510(k) Number	Device Name	Clearance Date	Primary Reason for 510(k) Submission
K112277	BD Veritor System for Rapid Detection of Flu A+B – CLIA Waived Kit	1/4/2012	Initial 510(k) clearance
K132259	BD Veritor System for Rapid Detection of Flu A+B – CLIA Waived Kit	8/7/2013	Provided analytical reactivity data for an A/H7N9 strain
K132256	BD Veritor System for Rapid Detection of Flu A+B – CLIA Waived Kit	9/23/2013	Provided analytical reactivity data for an A/H3N2v strain
K151301	BD Veritor System for Rapid Detection of Flu A+B – CLIA Waived Kit	6/8/2015	Provided analytical reactivity data for nine additional Flu A strains and five additional Flu B strains
K152870	BD Veritor System for Rapid Detection of Flu A+B – CLIA Waived Kit	10/27/2015	Provided analytical reactivity data for one additional Flu A strain and five additional Flu B strains
K160161	BD Veritor System for Rapid Detection of Flu A+B – CLIA Waived Kit	2/25/2016	Provided analytical reactivity data for two additional avian Flu A strains

2. Applicant's statement that the **INDICATION/INTENDED USE** of the modified device as described in its labeling **HAS NOT CHANGED** along with the proposed instructions for use.

3. A description of the device **MODIFICATION(S)** in sufficient detail to demonstrate that the **FUNDAMENTAL SCIENTIFIC TECHNOLOGY** of the modified device **has not changed**.

    1) The product package insert has been changed for the modified device reflecting the addition of a new performance table and related explanations in the Clinical Performance section. The following new performance table (appears as Table 1) is added in the revised product package insert:

Table 1: Summary of Performance Data of the BD Veritor System for Rapid Detection of Flu A + B Compared to PCR for All Swabs - All Sites

Note: The data in this table summarizes the performance of the Veritor Flu A + B assay test system across all age groups, clinical testing sites and sample types. The 95% Confidence intervals are calculated using an analysis that accounts for sources of heterogeneity.

	Reference PCR					Reference PCR		
POC: BD Flu A	P	N	Total		POC: BD Flu B	P	N	Total
P	189	13	202		P	139	10	149
N	37	497	534		N	32	555	587
Total	226	510	736		Total	171	565	736
Reference Method: PCR PPA: 83.6% (76.1%, 89.1%) NPA: 97.5% (95.7%, 98.5%)					Reference Method: PCR PPA: 81.3% (71.1%, 88.5%) NPA: 98.2% (95.7%, 99.3%)			
Wald 95% confidence intervals corrected for overdispersion, where needed, due to potential variability between sites.								

The sponsor provided the following justification for this modification:

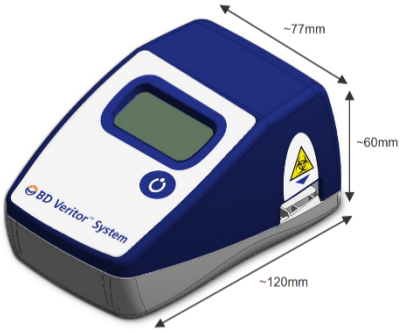
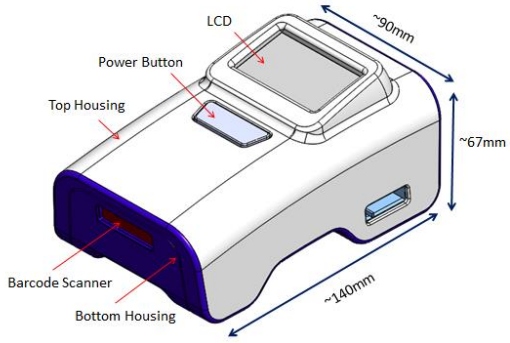
Estimates of performance for Rapid Influenza Diagnostic Tests (RIDTs) as assessed from prospective clinical studies are subject to numerous sources of variability that are difficult to understand or control. The heterogeneity that is seen across RIDT clinical studies justifies a statistical analytical approach that accounts for additional variability over the basic binomial model, which assumes that all clinical studies and sites have the same performance. Literature supported examples of some of the potential sources of variability leading to the heterogeneity include:

- Variation in circulating influenza strains from within and across seasons since it is known that immunoassays have varying affinity to different strains.
- Age of subjects with younger subjects demonstrating higher assay sensitivity.
- Nostril-to-nostril variance in viral load, within the same subject, as it has been shown that there are significant differences in viral load from one nostril when compared to the other.
- Swab-to-swab variability, since it is difficult to ensure identical quality when multiple swabs are collected, especially when patients may be less cooperative on the second swab.
- Technician-to-technician variability in the way the specimen is collected.
- Variability in time from onset of symptoms to diagnostic testing.
- Positive vaccination status which has been demonstrated to result in reduced viral loads in patients with acute influenza infection, with further variation caused by differences in vaccine effectiveness from season to season.

Provided literature in this submission supports the widely acknowledged observation that RIDT studies are subjected to substantial variability which supports the application of statistical methods that are designed to account for this variability.

2) In addition to the BD Veritor Reader, a second generation instrument, the BD Veritor Plus Analyzer with the flexibility of an optional bar code scanning module and cellular connectivity designed to facilitate record keeping, was added to the product package insert. The BD Veritor Plus Analyzer also enables the addition of a "Walk Away" workflow mode.

Table 2: Comparison of BD Veritor Reader and BD Veritor Plus Analyzer

Product Feature	BD Veritor Reader	BD Veritor Plus Analyzer
GENERAL:		
Appearance and dimensions		
Intended use	For use with BD Veritor System test devices	Same
Firmware functional verification	Verification cartridge supplied with each Reader	Same
Assay type determination	Internal camera reads barcode on test device	Same
Assay test device compatibility	Original	Same
Lifetime	3000 tests 24 months from first use 34 months from date of manufacture	3500 tests 24 months from first use 34 months from date of manufacture
Assay workflow options	Original or "Analyze Now": Assay device is prepared with processed patient sample, user manually times the assay development and inserts assay device when development time is complete.	• Analyze Now: unchanged • Walk-Away: Assay device is prepared with processed patient sample, inserted into the Analyzer immediately. Assay development is automatically timed by the instrument and result is displayed when development time is complete.
Qualitative or Quantitative Result	Qualitative	Qualitative, unchanged
Optional modular barcode scanner	Not Present	Captures and records Operator ID, Specimen ID, and/or test device lot information. Can be used to configure display languages.
Cellular modem available with InfoSync module	Not Present	Using HTTPS secure link, endpoint authentication, receipt confirmation. Automated connection to LIS/EMR.
Removable module or	Not Present	Analyzers have either a cover plate or are equipped

cover plate		with optional scanning module.
Printer	Not printer compatible	Compatible with external dedicated printer via USB.
ELECTRICAL:		
Batteries	User replaceable alkaline AA batteries	Li-ion rechargeable battery
AC power adapter	N/A	To charge the Li-ion battery and/or operate the analyzer from facility power.
Graphical display	40 mm x 19 mm	56 mm x 33 mm
Flash Memory	4 MB	8 MB
FIRMWARE:		
Assay positivity algorithm	Original	Same
Assay cutoff thresholds	Original	Same
Test menu	Original	Same
Cybersecurity controls	Not Present	To meet requirements for data privacy and anti-hacking protection.
USB OTG port	Not Present	To connect to printer or to a computer to display or print results. Input firmware or menu updates from flash drive.
Display languages	English or Japanese only	Six user selectable languages; English, French, Italian, German, Spanish, Swedish. (optional scanning module required for language configuration). Japanese model sold separately.

4. **Comparison Information** (similarities and differences) to applicant's legally marketed predicate device.

Item	Previously Cleared Device	Modified Device
Features	BD Veritor System for Rapid Detection of Flu A+B - CLIA Waived Kit (K112277)	BD Veritor System for Rapid Detection of Flu A+B - CLIA Waived Kit (K180438)
Intended Use	The BD Veritor System for Rapid Detection of Flu A+B is a rapid chromatographic immunoassay for the direct and qualitative detection of influenza A and B viral nucleoprotein antigens from nasal and nasopharyngeal swabs of symptomatic patients. The BD Veritor System for Rapid Detection of Flu A+B (also referred to as the BD Veritor System and BD Veritor System Flu A+B) is a differentiated test, such that influenza A viral antigens can be distinguished from influenza B viral antigens from a single processed sample using a single device. The test is to be used as an aid in the diagnosis of influenza A and B viral infections. A negative test is presumptive and it is recommended that these results be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay. Outside the U.S., a negative test is presumptive and it is recommended that these results be confirmed by viral culture or a molecular assay cleared for diagnostic use in the country of use. FDA has not cleared this device for use outside of the U.S. Negative test results do not preclude influenza viral infection and should not be used as the sole basis for treatment or other patient management decisions. The test is not intended to detect influenza C antigens. Performance characteristics for influenza A and B were established during January through March of 2011 when influenza viruses A/2009 H1N1, A/H3N2, B/Victoria lineage, and B/Yamagata lineage were the predominant influenza viruses in circulation according to the Morbidity and Mortality Weekly Report from the CDC entitled "Update: Influenza Activity—United States, 2010-2011 Season, and Composition of the 2011-2012 Influenza Vaccine." Performance characteristics may vary against other emerging influenza viruses. If infection with a novel influenza virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent influenza viruses and sent to the state or local health department for testing. Virus culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.	Unchanged
Specimen Types	Nasal and nasopharyngeal swabs	Unchanged

Item	Previously Cleared Device	Modified Device
Features	BD Veritor System for Rapid Detection of Flu A+B - CLIA Waived Kit (K112277)	BD Veritor System for Rapid Detection of Flu A+B - CLIA Waived Kit (K180438)
Assay Technology	Immunochromatographic	Unchanged
Detection Format	An opto-electronic reader determines the line intensity at each of the spatially defined test and control line positions, interprets the results using a scoring algorithm and reports a positive, negative or invalid result on the LCD screen based on pre-set thresholds.	Unchanged
Qualitative or Quantitative	Qualitative	Unchanged
Assay Run Time	Approximately 10 minutes	Unchanged
Control Format	Kit Flu A+/B- dry swab procedural control Kit Flu A-/B+ dry swab procedural control Internal positive control Internal negative control	Unchanged
Product Package Insert	Performance tables based on the clinical study data in the U.S. were presented separately from the performance tables based on the clinical study data in Japan in the Clinical Performance section of the product package insert.	Addition of a new performance table and related explanations in the Clinical Performance section of the product package insert that estimate assay performance based on the combined U.S. and Japan data using an over-dispersed binomial model to account for potential differences/variability between the U.S. and Japan clinical study sites.
Instrument	BD Veritor Reader	BD Veritor Reader and BD Veritor Plus Analyzer

5. A **Design Control Activities Summary** which includes:

   a) Identification of Risk Analysis method(s) used to assess the impact of the modification on the device and its components, and the results of the analysis.

   BD's Risk Assessment process is based on a BD Product Risk Management procedure which meets the requirement for risk management as set forth in ISO 14971:2007 and EN ISO 14971:2012. Using this procedure, the following are estimated:

   - the hazard,
   - the adverse effect (harm to patient),
   - the potential causes of the hazard,
   - any existing control measure
   - the probability of hazard severity and
   - the probability of occurrence

   b) Based on the Risk Analysis, an identification of the verification and/or validation activities required, including methods or tests used and acceptance criteria to be applied.

Based on a resulting calculated risk index, risk control measures are identified, required verification and validation activities are determined, and verification of the effectiveness of risk control measures is determined.

1) The inclusion of the additional performance table in the Clinical Performance section of the BD Veritor System Flu A+ B (CLIA-Waived kit) product package insert (PI) does not create any new product risks. There has been no change in the product formulation. The change is exclusively a labeling change, specifically the addition of a table presenting combined data from both U.S. and Japanese clinical study sites and the resulting sensitivity and specificity calculations. The current performance observed by customers will not change as there is no change to the design or production process for this product. Therefore, because the addition of a new performance table does not impact the risk associated with the device, the current risk assessment table will not change.

   A change control will be initiated to document this activity in the design history file and to route the new PI for approval. Modifications to the product package insert will be implemented in accordance to BD Change Control Procedure BDDSQP0402.

2) The risk assessment identified the need to confirm the Veritor Plus Analyzer's ability to produce assay results equivalent to those obtained with the Veritor Reader in either "Analyze Now" or "Walk Away" workflow mode. The identified studies were performed according to appropriate design control procedures to assess the addition of the Veritor Plus Analyzer in either mode as an interpretation instrument for the Veritor System Flu A + B CLIA-Waived assay product. The results of testing did not identify new issues of safety and effectiveness.

   At the BD Diagnostics Systems research and development (R&D) center in San Diego, CA, BD staff performed studies testing both analytical and clinical samples to confirm that the performance of the Veritor Plus Analyzer is equivalent to the Veritor Reader when used in both "Read Now" and "Walk-Away" modes.

   BD R&D staff tested the following analytical samples
   - Samples with true zero values (no analyte)
   - High negative and low positive samples (near cut-off samples)

   The data collected testing the analytical samples demonstrated that the average numerical values and percentage positivity for Veritor Plus Analyzers when used in both "Read Now" and "Walk-Away" workflow modes are equivalent to Veritor Readers.

   BD R&D staff also tested the following clinical samples:
   - 102 Flu A-/B- samples
   - 52 Flu A+ samples
   - 52 Flu B+ samples

The data collected with clinical samples also indicate that assay results obtained using Veritor Plus Analyzers (in both "Read Now" and "Walk-Away" workflow modes) are equivalent to Veritor Readers.

The risk assessment also identified the need to confirm that the addition of the bar code scanning functions of InfoScan and InfoSync modules, and any associated screen displays, alerts and error messages had no effect on safety or effectiveness when the Veritor Plus Analyzer was used with the Veritor CLIA-waived Flu A + B Assay. Software verification activities were performed and all testing criteria were met to confirm that changes and additions made to firmware to add new functionality had no impact on the ability of the instrument to generate a correct assay result. Cybersecurity risks and vulnerabilities associated with the use of the InfoSync module were assessed and BD procedures and controls were verified as acceptable to protect user and patient data.

6. **Conclusion**

The labeling for this modified subject device has been reviewed to verify that the indication/intended use for the device is unaffected by the modifications. In addition, the applicant's description of the particular modifications and the comparative information between the modified and unmodified devices demonstrate that the fundamental scientific technology has not changed. The applicant has provided the design control information as specified in The New 510(k) Paradigm and on this basis, I recommend the device be determined substantially equivalent to the predicate device.