User Guide

nVISION®

Pulse Oximetry

Data Management Software

Version 6.5.3

English

Nonin® reserves the right to make changes and improvements to this manual and the products it describes at any time, without notice or obligation.

Nonin Medical, Inc.
13700 1st Avenue North
Plymouth, MN 55441, USA

Phone: +1-763-553-9968
Toll-Free: +1-800-356-8874 (U.S.A. and Canada only)

E-mail: info@nonin.com

Customer Service

North America, Latin America, and Asia Pacific

email: orders@nonin.com

Europe, Middle East, Africa, India, and the Indian Subcontinent

email: ordersintl@nonin.com

Technical Service

North America, Latin America, and Asia Pacific

email: technicalservice@nonin.com

Europe, Middle East, Africa, India, and the Indian Subcontinent

email: technicalserviceintl@nonin.com

References to “Nonin” in this manual imply Nonin Medical, Inc.
Nonin and nVISION are trademarks of Nonin Medical, Inc.
Other trademarks and trade names are those of their respective owners.

The Bluetooth® word mark and logo are registered trademarks owned by Bluetooth SIG, Inc.

© 2026 Nonin Medical, Inc.
112073-001-02

Contents

Introduction **1**
Intended Use/Intended Purpose 1
Symbols 1
Computer Requirements 1
Installing the Software 2
Opening the Software 2
Uninstalling the Software 2
Getting Started **3**
System Setup 3
Overview — Using nVISION 3
nVISION Notes 4
Comm Port Notes 4
nVISION Features **6**
Toolbar 6
Status Bar 6
File Menu 7
New Data Capture 7
Settings Button — Enter Wrist Oximeter Settings 8
Open Saved Data 9
Close 9
Save 10
Save As 10
Import 10
Export 11
Save XML Data 11
Print 12
Print Preview 12
Print Setup 12
Exit 13
Edit Menu 13
Summarize Data 13
Selecting an Area of Interest 14
Exclude Data 15
Excluding Data 15
Patient Info 16
Patient History File 17
Creating Patient Information 18
Editing Stored Patient Information 19
Deleting Patient Information 19
Options Menu 19
Comm Port 20
Data Path 20

Contents (Continued)

XML Options 21
Analysis Parameters 21
Setting System Analysis Parameters 23
Setting Case-Specific Analysis Parameters 24
Display Parameters 24
Language 25
Report Menu 26

nVISION Reports 26

Report Features 26
Report Title 27
Default Report 27
Units of Measure 27
Report Heading Field Descriptions 27
Oximetry Report (Default Report) 28
Example: Oximetry Report 29
Oximetry Report Field Descriptions 29
Strip Chart Report 31
Example: Strip Chart Report 31
Full Study Report 32
Example: Full Study Report 32
Respiration Rate Report 33
Example: Respiration Rate Report 34
Respiration Rate Report Field Descriptions 34
Summary Report 35
Example: Summary Report 36
Summary Report Field Descriptions 36
6-Minute Walk Report 38
Example: 6-Minute Walk Report 39
6-Minute Walk Report Field Descriptions 39

Help Menu 40

Help Topics 40
Using nVISION Help 41
About nVISION 41

Using nVISION 41

Creating Patient Identification Before Download (Recommended) 41
Downloading Data 42
Model-Specific Data Download Information 43
Saving Data Sets — New Patient Without Patient History 43
Saving Data Sets — Existing Patient with Patient History 44
Editing and Analyzing the Data 44
Report Considerations 45

Contents (Continued)

Tutorial **46**
Using the Strip Chart Report to Analyze Data 46
Excluding and Summarizing Data 47
Saving Data 47
Other Reports 47
Technical Support **48**
Limited Use Software Agreement **49**

Introduction

Intended Use/Intended Purpose

Nonin's nVISION® software provides a convenient user interface for capturing, editing, storing, analyzing, and printing patient data from Nonin pulse oximeters.
nVISION enables users of Nonin pulse oximeters to download patient data during memory playback and then save the data on a PC with a Windows® XP SP3, Vista, 7 (32 bit and 64 bit), 8 (32 bit and 64 bit), 10 (32 bit and 64 bit) or 11 (64 bit) operating system. nVISION also enables users to review, analyze, and edit saved data sets and to print reports.
nVISION software is intended to be used with with Nonin pulse oximeters that store data into memory, as well as the TrendSense memory modules.

NOTE: Do not use nVISION data as the sole basis for making a medical diagnosis.

Symbols

Symbol	Description
	Consult instructions for use
	Global Trade Item Number
	Lot code/Batch code
	Catalog number

Computer Requirements

- PC with a 133 MHz Pentium microprocessor or equivalent
- Windows XP SP3, Windows Vista, Windows 7 (32 bit and 64 bit), Windows 8 (32 bit and 64 bit), Windows 10 (32 bit and 64 bit), or Windows 11 (64 bit) operating systems
- At least 256 Mb of RAM (memory)
- At least 20 Mb free space on the hard drive
- Video card with 800 x 600 VGA resolution
- At least 1 communications port (comm port)

Installing the Software

NOTE: Before beginning installation, ensure the PC meets the minimum system requirements (see Computer Requirements).

1. Visit the activation page using the URL (Download.nonin.com) on your Postcard.
2. Click “Get Started”, add it to cart, complete the no-cost checkout, and submit your order. An order confirmation email is sent. (Note: Account approval typically takes 1-3 business days).
3. Once approved, you will receive a second email containing the download link and installation instructions.
4. Click the link included in the second email, download and run the installer. The install program should start automatically. See below if it does not automatically install.
5. Follow prompts to complete install.
   - In the serial field in the registration window, enter the key code (including dashes) found in the postcard mailer. The installation will not proceed if an invalid key code is entered.
   - If the PC already has nVISION installed on it, the installed version is automatically overwritten and the key code does not need to be entered.

NOTE: Have the key code available when calling Nonin Technical Support. The key code can be found by clicking **Help > About nVISION**.

If nVISION does not automatically install:

1. Navigate to the Download folder.
2. Open the nVisionVer6_5_3.exe file.
3. Follow the on-screen instructions until the install is completed.

Opening the Software

1. Click the nVISION desktop icon , or find the program:
   - For Windows 7, Vista, and XP, click **Start > Programs > Nonin Medical, Inc**.
   - For Windows 8, right click on the Start screen, and then click the **All apps** button on the App bar. Locate the **Nonin Medical, Inc**. group.
   - For Windows 10 or 11

     Option 1: click on Start and select the nVISION application

     Option 2: Type nVISION in the Search bar and select the nVISION application
2. Click **nVISION**. nVISION main window opens.

NOTE: Windows Vista users will need administrative rights to install the software.

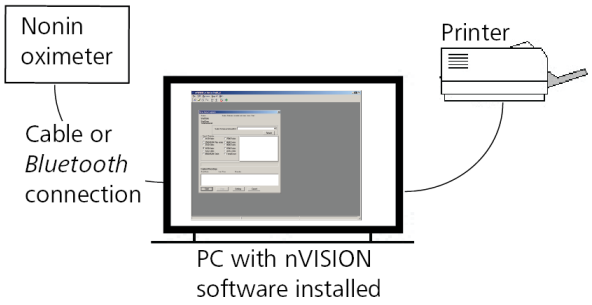
Uninstalling the Software

1. Click **Start > Control Panel > Programs and Features**.
2. Scroll through the list and click **nVISION**.
3. Click **Uninstall**.
4. Follow the on-screen instructions for uninstalling the program. Answer “yes” to the questions regarding files to be removed.

Getting Started

System Setup

nVISION software is one part of an integrated system consisting of a Nonin pulse oximeter, the appropriate Nonin cable or a Bluetooth connection, a PC with a printer, and nVISION software.



NOTES:

- nVISION is not a networked application.
- Model-specific Nonin cables, adapters, or modules are required for downloading data.

Cable/Adapter/Module	Model
UNI-RS232	2120, 9600, 9700
1000MC / 1000RTC / 1000USB (requires software installation)	2500, 2500A
3150SC (requires software installation)	3150 USB, 3150 BLE
7500SC	7500, 7500FO
TrendSense	LifeSense, RespSense

Overview — Using nVISION

The following steps briefly describe how to use nVISION to create and print a report.

1. Install nVISION software (see “Installing the Software” on page 2).
2. Install any needed USB driver software.
   - **3150 users only** –– Before downloading data from a 3150, the USB cable driver software must be installed on the PC. The USB driver software can be found on nonin.com. Instructions for downloading the software are in the 3150 operator’s manual.
   - **1000USB users only** — Before downloading data with the cable, the 1000USB driver software must be installed on the PC. The USB driver software can be found on nonin.com. Instructions for downloading the software are in the 1000USB instructions for use.
3. Connect the device to the PC, or connect the device using a Bluetooth connection.
4. Open nVISION (see “Opening the Software” on page 2).
5. Set up nVISION:
   a. Set the report title (see “Report Title” on page 28).

   b. Set the units of measure (see “Units of Measure” on page 28).
   c. Set the display parameters (see “Display Parameters” on page 25).
   d. Set the analysis parameters (see “Analysis Parameters” on page 22).
6. Capture (download) data (see “Downloading Data” on page 43) or open a saved data set.
7. Save a data set (see “Save” on page 10, “Save As” on page 10, and “Save XML Data” on page 11).
8. Edit and analyze the data (see Summarize Data, Excluding Data, and Strip Chart Report).
9. Select and print a report (see Report Menu).

nVISION Notes

- In order for stored data to correlate to a 24-hour clock, the time and date must be set in the oximeter **before** recording patient data. If time and date are not set before recording data, nVISION automatically assigns the time and date set in the PC at the time of download as the study time.
- nVISION displays an error message if a data download is not successful.
- Data remains in the pulse oximeter’s memory until it is deleted. See the device’s operator’s manual for instructions on how to delete stored data.
- Only one data set can be open at a time.
- Data can be exported and saved as a .pdf or in .asc (comma-separated ASCII [American Standard Code for Information Interchange]) format. The .asc format is used for evaluating data in spreadsheet software.
- Multiple data sets can be merged into one data set during download. In Oximetry, Strip Chart and Full Study reports, merged recordings have a crosshatched pattern between data sets to show the break in the data. If the date and time are not set in the pulse oximeter before data is recorded, the crosshatched area defaults to 10 minutes.
- A missing data marker replaces data if the oximeter is not able to track the patient’s SpO_2, pulse rate, and/or respiration rate. The missing data appears as a gap in the graphical summary. Depending upon the report’s scale, the missing data may or may not be noticeable.
- An event is determined by user-selected analysis parameters (Edit > Analysis Parameters) and occurs after the event criteria are met or exceeded.

Comm Port Notes

- When using a serial cable, COM 1 or COM 2 are the most likely comm ports for the RS232 port.
- When using a serial cable with a USB adapter, determine the comm port with the following steps:
   a. Unplug the USB adapter from the computer.
   b. View the COM ports in the Device Manager window:
      – For Windows 7, Vista, and XP, click Start > Control Panel > Device Manager. In the Device Manager window, expand Ports (COM & LPT). Continue with step c.

- For Windows 8, right click on the Start screen, click All apps in the App bar, click Control Panel in the Windows System grouping, and then click Device Manager. In the Device Manager window, expand Ports (COM & LPT). Continue with step c.
- For Windows 10 or 11, right click on th e Start Screen, then click Device Manager. In the Device Manager window, expand Ports (COM & LPT). Continue with step c.

c. Plug the USB adapter into the computer. The Ports (COM & LPT) list will refresh and a new COM port will display (it may say USB-to-Serial Comm Port). Select this COM port in the New Data Capture dialog box.

nVISION Features

In addition to the five main menus, nVISION has a toolbar with shortcuts to the most commonly used features and a status bar.

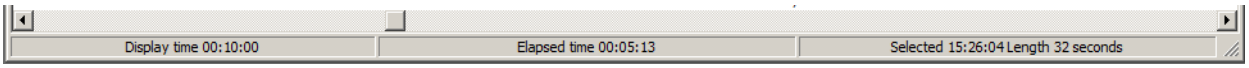
Toolbar

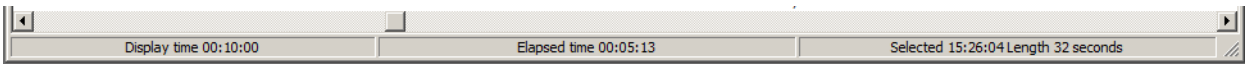
The nVISION toolbar provides shortcuts to frequently used commands.

- File > New Data Capture
- File > Open Saved Data
- File > Print
- File > Print Preview
- Edit > Summarize Data
- Edit > Exclude Data
- Options > Display Parameters
- Options > Language

Status Bar

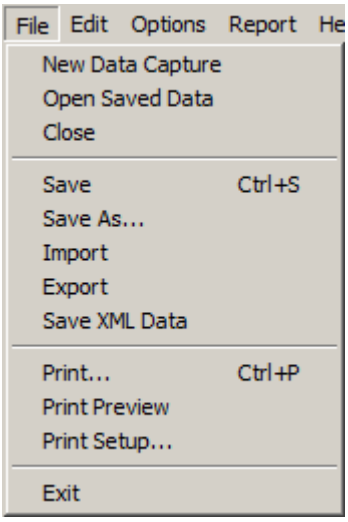
The status bar has three sections and displays at the bottom of the nVISION window. The status bar is used with the Strip Chart and Full Study reports.





Field	Description
Display Time	Left section of status bar. Used in Strip Chart and Full Study reports, but displays on all reports. This field shows the amount of time that displays on screen. Set through Options > Display Parameters > Time Interval.
Elapsed Time	Middle section of status bar. Used in Strip Chart and Full Study reports, but displays on all reports. This field shows the amount of time the user has scrolled through to get to the data shown on screen. In other reports, the elapsed time is 00:00:00.
Selected Time or Cursor Time	Right section of status bar on Strip Chart report. This section is used for both Selected and Cursor time. Selected time – The start time for a selected area of interest and the length of time (in seconds) in the area of interest. Cursor time – Left click in graph to display the time for a specific point in the graph. Right click and hold the mouse button to display the cursor time along with the SpO_2 and pulse rate data values for a specific point in the graph.

File Menu



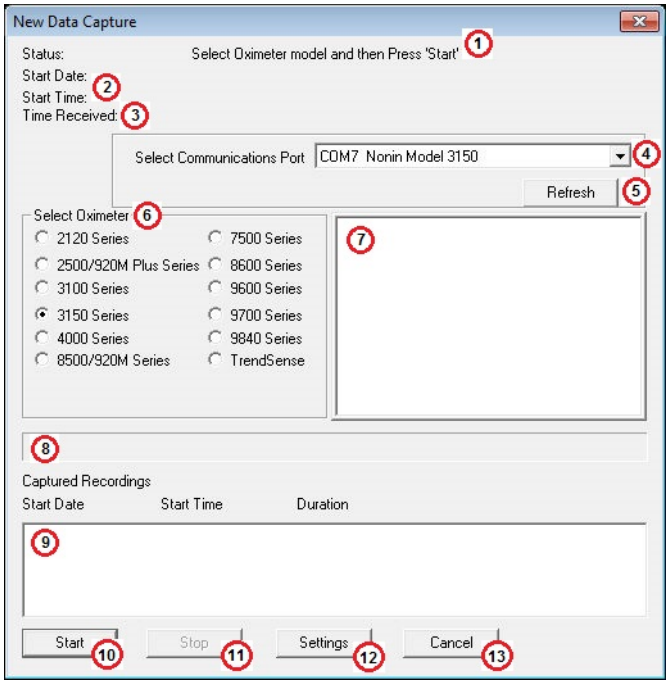
New Data Capture

The New Data Capture feature downloads data from a Nonin pulse oximeter.

To store data in the pulse oximeter's memory, the monitoring duration must be at least 1 minute.

Click **File > New Data Capture** or the Data Capture icon to open the New Data Capture dialog box.

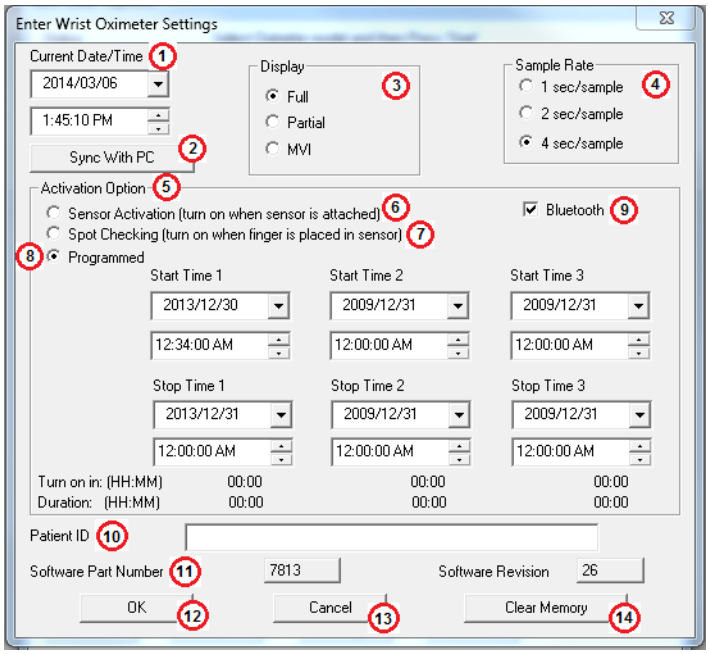
See "Downloading Data" on page 43 for instructions on how to download data from an oximeter.



No.	Description
1	Status – Displays status messages (e.g., Waiting..., Receiving...).
2	Start Date/Start Time – Shows time and date of the recording being downloaded.
3	Time Received – Updates periodically to indicate the number of hours of data that have been captured for the recording being downloaded.
4	Select Communications Port drop-down menu – Provides a list of the computer's comm ports.
5	Refresh button – Updates the list of comm ports in the Select Communications Port drop-down menu.
6	Select Oximeter box – Lists Nonin pulse oximeters that work with nVISION.

No.	Description
7	Instruction box – Lists model-specific instructions for downloading data from the pulse oximeter.
8	Progress bar – Shows the progress for the recording being downloaded.
9	Captured Recordings box – Updates as each recording is downloaded from the oximeter, with the most recent recording shown at the top.
10	Start button – Begins the download process.
11	Stop button – Allows the user to end the download process after the desired data segment(s) is listed in the Captured Recordings box.
12	Settings button – Opens the Enter Wrist Oximeter Settings dialog box. This dialog box is only used to setup and program 3150 oximeters. See Settings Button – Enter Wrist Oximeter Settings section for more information.
13	Cancel button – Cancels the download process.

Settings Button — Enter Wrist Oximeter Settings



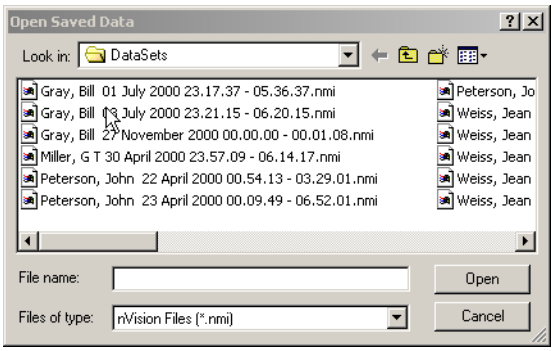
No.	Description
1	Current Date/Time – Displays date/time programmed in the device.
2	Sync with PC button – Synchronizes device date/time to the PC date/time.
3	Display – Options include Full, Partial, and MVI (3150 only). Full display shows %SpO2 and pulse rate. Partial display shows pulse strength indicator, but not %SpO2 and pulse rate. MVI (memory volume) display shows pulse strength indicator and volume (hours and minutes) of data stored in memory, but not %SpO2 and pulse rate. See the operator's manual for more information.
4	Sample Rate – Patient data storage rate can be set to 1, 2, or 4 seconds. Data sets recorded with different sample rates cannot be merged.

No.	Description
5	Activation Option – Device turn on modes. Options include Sensor Activation, Spot Checking, and Programmed. See the operator's manual for more information.
6	Sensor Activation – Device turns on when the activation switch is pressed or when the sensor is disconnected and reconnected.
7	Spot Checking – Default turn on mode. Device turns on when finger is inserted in the sensor.
8	Programmed – Allows the device to be programmed to start and stop for up to three sessions. To function in Programmed mode, at least one interval must have a future stop time selected, with an earlier start time and the device time must be set to at least 1/1/2002. If these conditions are not met, the following message displays: *Warning - Settings may prevent data collection. Continue?*
9	Bluetooth – 3150 only. When checked, the *Bluetooth* radio is enabled at startup.
10	Patient ID – Space to enter a description.
11	Software Part Number/Revision – Software information for the connected device.
12	OK button – Programs current settings to the device. Dialog box closes and nVISION returns to the New Data Capture dialog box.
13	Cancel button – Cancels current settings. Dialog box closes and nVISION returns to the New Data Capture dialog box.
14	Clear Memory button – Clears the device memory. Popup message asks *OK to Clear Patient Memory?* Click Yes to clear the device memory and return to the Enter Wrist Oximeter Settings dialog box. Click No or Cancel to return to the Enter Wrist Oximeter Settings dialog box without clearing the memory.

Open Saved Data

1. To open a saved data set, click **File > Open Saved Data** or the Open icon . The Open Saved Data dialog box opens to the default directory.

NOTE: The default directory is set through **Options > Data Path**.



2. Select an nVISION (.nmi) case to open.
3. Click **Open**. The data set displays as an Oximetry report.
4. Click **Cancel** to close the dialog box without opening a data set.

Close

To close a data set without saving any changes, click **File > Close**. nVISION remains open.

Save

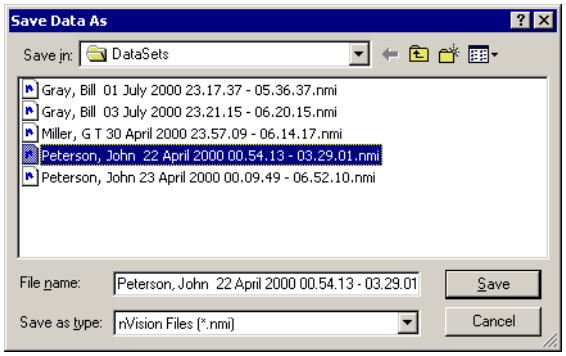
To save an open data set with the same file name, click **File > Save**. The case is saved and overwrites the previous data set.

NOTE: nVISION does not autosave open files. Changes made to a file must be saved before closing the file.

Save As

The Save As feature allows the user to edit an existing data set and save it with a different file name while maintaining the original data set.

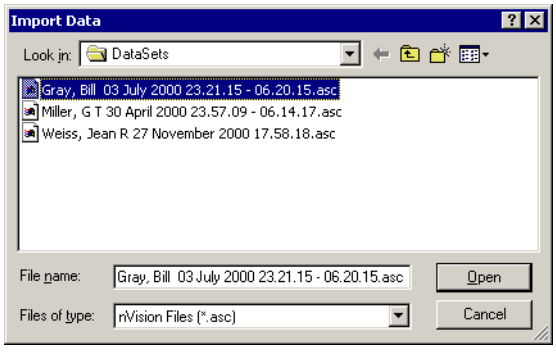
1. With a data set open, click **File > Save As**. Save Data As dialog box displays. Data sets can be saved in any directory, but the starting folder is the default directory (set through **Options > Data Path**).
2. The default name for the new data set is the existing file name with a number enclosed in parentheses (number of copies of the data set that have been saved). Use this name or enter a new name in the File name box
3. Click **Save**. The data set with the new file name becomes the open data set.



Import

The Import feature allows the user to import an ASCII file into the DataSets directory and the Patient History database.

1. Click **File > Import**. Import Data dialog box displays.
2. Locate and click on the data set to be imported. The starting folder is the default data storage path (set through **Options > Data Path**).
3. Select a data set.
4. Click **Open**. The data set displays as an Oximetry report.
5. Click **Cancel** to close the dialog box without importing a data set.



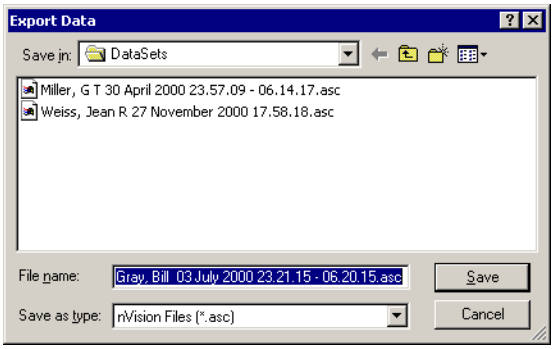
NOTE: Importing a case closes any case that was open.

Export

The Export feature allows the user to export data from nVISION to a PDF (.pdf) or a comma-separated ASCII file (.asc). Data saved in .asc format can be viewed and evaluated using spreadsheet software. Data saved as a .pdf can be viewed using Adobe Reader.

In an .asc file, patient information displays at the top of the spreadsheet and is followed by rows of data. Each row of data contains Patient ID, Year, Month, Day, Hr, Min, Sec, Pulse Rate, %SpO_2, and Respiration Rate (if available).

1. While viewing a case, click **File > Export**. Export Data dialog box displays.
2. Determine location for saving the case. The starting folder is the default directory (set through **Options > Data Path**).
3. File name automatically populates. Change as needed.
4. In the Save as type drop-down list, select either .pdf or .asc.
5. Click **Save**.



NOTE: PDF files cannot be read back into nVISION.

Save XML Data

The Save XML Data feature is only available when a data set is open as an Oximetry report. The Save XML Data command creates an XML file and two associated .png files (e.g., fileName.xml; fileName.pulse.png; fileName.spo2.png). The three files are saved to the XMLData folder and must remain in the same directory to display properly.

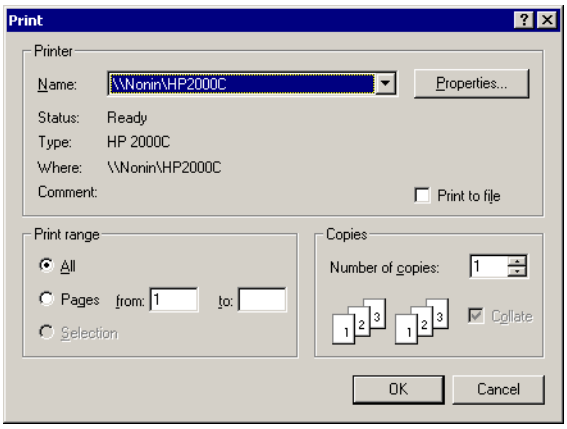
The XML file has the same name as the data set's .nmi file. The .png files are the SpO_2 and pulse rate graphs that are referenced in the XML file.

Once saved, XML files cannot be saved again until the study is reopened (**File > Open Saved Data**).

See "XML Options" on page 22 for more information.

Print

To print a report, click **File > Print**, or click the Print icon to display the Print dialog box.



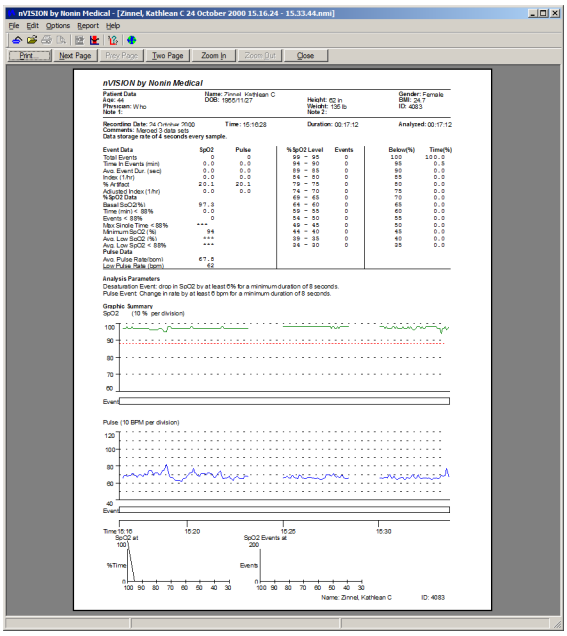
See the “Report Menu” on page 27 section for information on the different types of reports available.

Print Preview

The Print Preview feature is used to view how the report would appear when printed.

To preview a report, click **File > Print Preview** or the Print Preview icon . Print Preview window displays with the following buttons.

- **Print** – displays the Print dialog box.
- **Next Page/Prev Page** (previous page) – navigates through the pages in a multi-page report.
- **One Page/Two Page** – alternates between a one and two page view of the report.
- **Zoom In/Zoom Out** – magnifies or reduces the report content.
- **Close** – closes the Print Preview window.



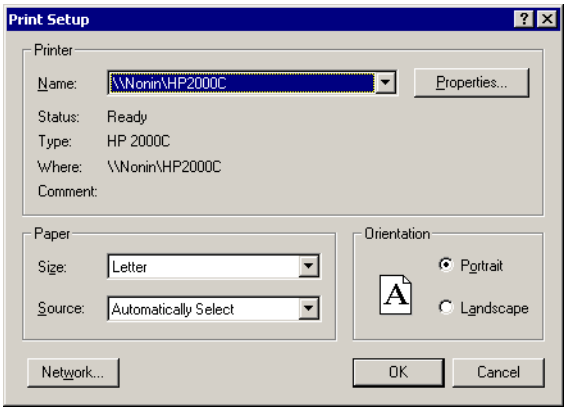
Print Setup

Print Setup selects a printer and printer connection.

Click **File > Print Setup** to display the Print Setup dialog box.

Setup the printer as needed and click **OK**.

Click **Cancel** to close the dialog box without saving changes.



Exit

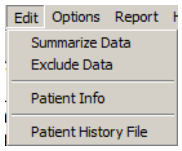
To exit the software, click **File > Exit**.

NOTE: Changes to a data set are not saved unless the file is saved using Save or Save As.

Edit Menu

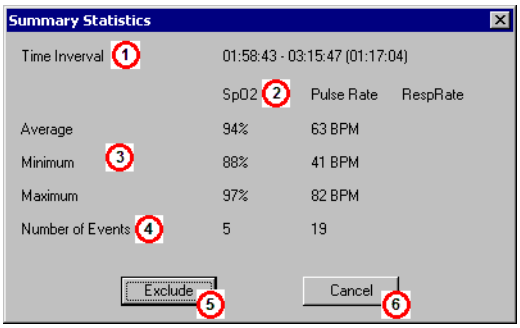
The Edit menu is used to edit data sets and create/edit patient information.

NOTE: Edit > Patient Info is only available when a data set is open.



Summarize Data

The Summarize Data option is only available when an area of interest has been selected in a Strip Chart report. To view, select an area of interest (see “Selecting an Area of Interest” on page 14) and then click **Edit > Summarize Data**. Summary Statistics dialog box displays.



No.	Description
1	Time Interval – The start time, end time, and the time interval length for the selected area of interest.
2	Column headings (SpO_2, Pulse Rate, RespRate [respiration rate]) for the data categories that may be in the Strip Chart report.
3	The average, minimum, and maximum values in each data category during the time interval.
4	The number of events that occurred in each data category during the time interval.
5	Exclude button – Opens the Exclude Data Segments dialog box (see “Exclude Data” on page 15).
6	Cancel button – Closes the Summary Statistics dialog box and removes the area of interest from the Strip Chart report. The data remains in the analysis.

Selecting an Area of Interest

An area of interest, drawn on the Strip Chart and indicated by a red, dashed-line rectangle, is used to analyze a specific block of data. The user can review a statistical summary of the data within the rectangle and then identify and select areas of artifact (corrupt or meaningless data) to be excluded from the analysis.

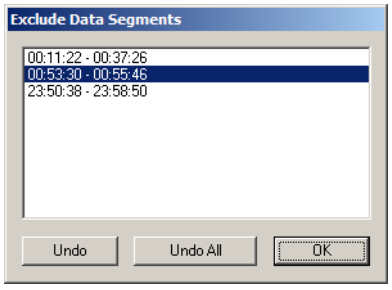
1. Open data and view as a Strip Chart report.
2. Using the mouse, position the cursor at one edge of the desired area in a data graph. Press and hold the left mouse button.
3. Drag the cursor across the desired area. While the cursor is dragged, the boundaries of the selected area are defined by a red rectangle on all graphs.
4. Once the area of interest is selected, release the mouse button. The red, dashed-line rectangle remains.
5. Click **Edit > Summarize Data** or the Summarize Data icon to display the Summary Statistics dialog box.
6. Click **Exclude** to add the time interval to the list of excluded data segments. Excluded Data Segments dialog box displays. See “Exclude Data” on page 15 for more information.

Exclude Data

The Exclude Data feature allows the user to remove, eliminate, or reject suspect data segments from the data analysis. Excluded data has a crosshatched pattern when viewed on screen or printed (Oximetry, Strip Chart, or Full report).

Excluding Data

1. Open data and view as a Strip Chart report.
2. Select an area of interest on the report (see “Selecting an Area of Interest” on page 14).
3. Click **Edit > Exclude Data** or the Exclude Data icon . Exclude Data Segments dialog box displays and highlights the just-selected data interval in the list of excluded segments.



4. To exclude the highlighted segment, click **OK**. Dialog box closes. The excluded data displays in rec over the crosshatching (as shown in “Exclude Data” on page 15).
5. To cancel the exclude data process or to un-exclude data, select a data segment and then click **Undo or Undo All**.
   - Undo – selected data segment is no longer excluded from the analysis. Dialog box closes.
   - Undo All – all shown data segments are no longer excluded from the analysis. Dialog box closes.

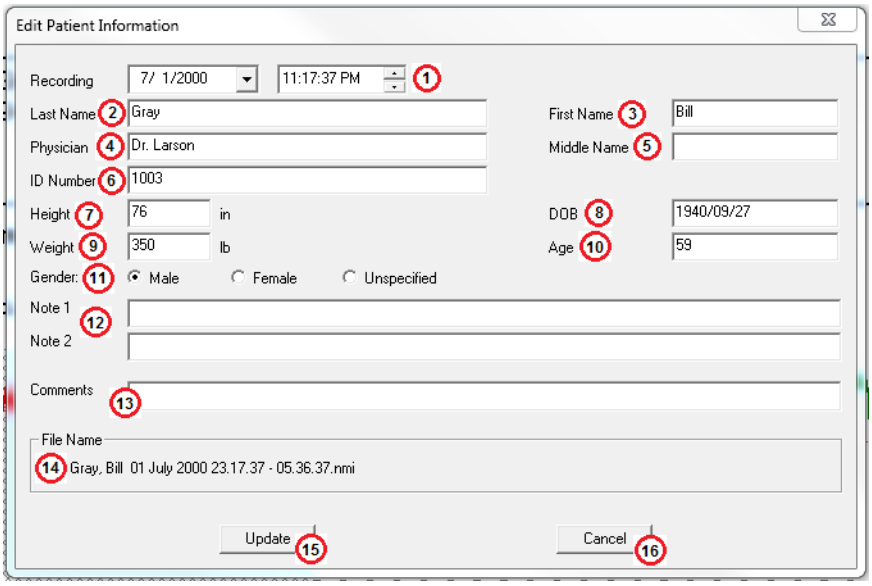
NOTE: Excluded data are included in the calculation of % Artifact and in the Duration time used to calculate the Index.

Patient Info

The Patient Info feature allows users to make case-specific changes to patient information.

1. Open a data set.
2. Click **Edit > Patient Info**. Edit Patient Information dialog box opens.
3. Edit the patient information.
   - Click **Update**. Patient information updates and dialog box closes.
   - Click **Cancel**. Dialog box closes without saving changes.

NOTE: When patient information is updated using the Edit Patient Information dialog box, the updates are only reflected in the open data set. This allows nVISION users to track and record patient changes without changing the patient history file (see “Patient History File” on page 17 for more information).



No.	Description
1	Recording time – Automatically populates with the date/time stamp. The date/time can be changed.
2	Last name – Limited to 30 alphanumeric characters. A search criteria in the Patient History File.
3	First name – Limited to 16 alphanumeric characters.
4	Physician – Limited to 40 alphanumeric characters.
5	Middle Name – Limited to 14 alphanumeric characters.
6	ID Number – Limited to 12 alphanumeric characters. A search criteria in the Patient History File.
7	Height – Limited to numeric characters.
8	DOB – Date of birth (YYYY/MM/DD).
9	Weight – Limited to numeric characters.
10	Age – Automatically populates when the DOB field is completed.
11	Gender – Options include Male, Female, and Unspecified. Default is unspecified.

No.	Description
12	Note 1/Note 2 – Each note is limited to 40 alphanumeric characters.
13	Comments – Limited to 80 alphanumeric characters.
14	File name – Automatically populates with the file name of the associated data set.
15	Update button – When selected, the patient information updates and is automatically saved in the recording. Dialog box closes.
16	Cancel button – Closes the dialog box without saving changes.

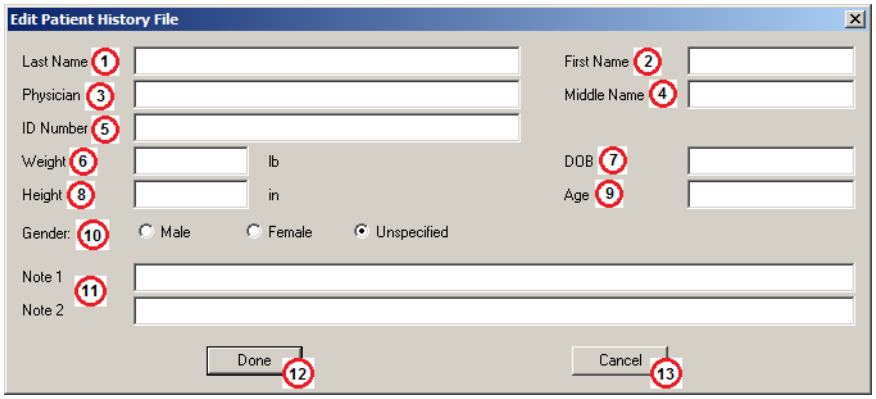
Patient History File

The Patient History File is nVISION's internal database of patient information. Patient information can be created prior to or during data download. In locations with a high volume of patients, it is recommended that patient information be created prior to data download (see "Creating Patient Information" on page 18).

After patient information is saved, the patient history file recalls the patient information during the data download process so it can be associated with a new data file.

Updates can be made to the to patient information in the patient history file. This allows users to track and record the patient history without changing captured recordings (see "Editing Stored Patient Information" on page 19).

To edit patient information stored within a specific case, see "Patient Info" on page 16.



No.	Description
1	Last name – Limited to 30 alphanumeric characters. A search criteria in the Patient History File.
2	First name – Limited to 16 alphanumeric characters.
3	Physician – Limited to 40 alphanumeric characters.
4	Middle Name – Limited to 14 alphanumeric characters.
5	ID Number – Limited to 12 alphanumeric characters. A search criteria in the Patient History File.
6	Weight – Limited to numeric characters. Defaults to 0 if left blank
7	DOB – Date of birth (YYYY/MM/DD). Defaults to current date if left blank.
8	Height – Limited to numeric characters.

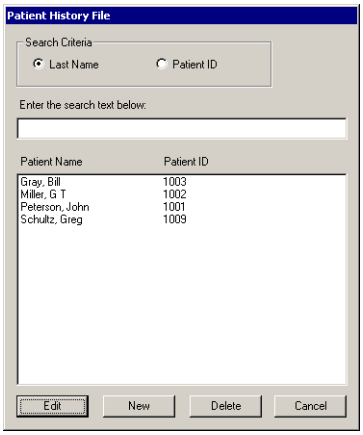
No.	Description
9	Age – Automatically populates when the DOB field is completed.
10	Gender – Options include Male, Female, and Unspecified. Default is unspecified.
11	Note 1/Note 2 – Each note is limited to 40 alphanumeric characters.
12	Done button – Patient information updates and dialog box closes.
13	Cancel button – Closes the dialog box without saving changes.

Creating Patient Information

1. Click **Edit > Patient History File**. Patient History File dialog box opens.
2. To create a new patient, click **New**. A blank Edit Patient History File dialog box opens.
3. Edit the patient information. Complete required fields (first name, last name, and ID number).
4. When finished:
   - Click **Done**. Patient information updates and dialog box closes.
   - Click **Cancel**. Dialog box closes without saving changes.

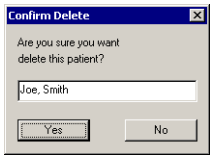
Editing Stored Patient Information

1. Click **Edit > Patient History File**. Patient History File dialog box displays.
2. If needed, select a Search Criteria (Last Name or Patient ID) and enter search text. Patient information records, sorted by the selected search criteria, display in the Patient Name/Patient ID window.
3. Select a patient record and click **Edit**. Edit Patient History File dialog box displays.
4. Edit the patient information.
   - Click **Done**. Patient information updates and dialog box closes.
   - Click **Cancel**. Dialog box closes without saving changes.



Deleting Patient Information

1. Click **Edit > Patient History File**. Patient History File dialog box displays.
2. If needed, select a Search Criteria (Last Name or Patient ID) and enter search text. Patient information records, sorted by the selected search criteria, display in the Patient Name/Patient ID window.
3. Select a patient record and click **Delete**. Confirm Delete dialog box displays with the patient's name.
   - Click **No** to close the Confirm Delete dialog box. The patient record is not deleted.
   - Click **Yes** to delete the patient record and close the Confirm Delete dialog box.

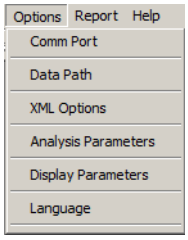


NOTE: Deleting patient information does not delete any associated case studies. Saved case studies must be deleted individually.

Options Menu

The Options menu allows users to configure and save nVISION parameters. InVISION uses the default parameters until the settings are changed.

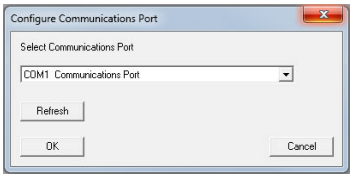
- Comm Port
- Data Path
- XML Options
- Analysis Parameters
- Display Parameters
- Language



Comm Port

The Configure Communications Port dialog box is used to choose the communications port (COM port) for the cable.

1. Click **Options > Comm Port**. Configure Communications Port dialog box opens.
2. Using the drop-down menu, select the appropriate comm port. If needed, click **Refresh** to refresh the list.
   - Click **OK** to save the selected communications port and use it for data capture. Dialog box closes.
   - Click **Cancel** to close the dialog box without saving changes.

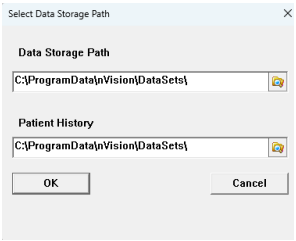


When using a *Bluetooth* wireless connection, the communications port that was associated with the device when it was paired must be selected. Refer to the *Bluetooth* stack instructions to determine how to do this.

Data Path

The Select Data Storage Path dialog box is used to set the default data storage path. nVISION saves data sets (case studies) to this directory.

Click **Options > Data Path** to open the Select Data Storage Path dialog box.



- Click **OK** to save the selected directory and close the dialog box.
- Click **Browse** folder.

  There are two storage path locations.

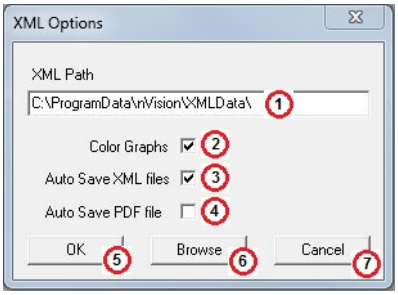
  • Data Storage Path - location where all saved NMI and PDF files will be stored.

  • Patient history - location containing Rolodex of patient history files.

  - Click **Cancel** to close the Select Folder dialog box without selecting a folder.
  - Click **OK** to select a directory and return to the Select Data Storage Path dialog box. The directory path should display in the dialog box.
- Click **Cancel** to close the dialog box without saving changes.

XML Options

To open the XML Options dialog box, click **Options > XML Options**. See “Save XML Data” on page 11 for more information about XML file structure.



No.	Description
1	XML Path – Default data storage path for XML files.
2	Color Graphs – When selected, graph lines in the XML graph files match the on-screen colors. If not selected, the graph lines are black.
3	Auto Save XML Files – When selected, XML files are generated and saved when a study is downloaded and associated with patient information.
4	Auto Save PDF File – When selected, an Oximetry report PDF is generated and saved when the study is downloaded and associated with patient information. The PDF saves to the nVISION default directory.
5	OK button – Accepts all changes made in the XML Options dialog box and the dialog box closes.
6	Browse button – Select Folder window opens to change default storage directory for XML files.
7	Cancel button – Closes the dialog box without saving any changes.

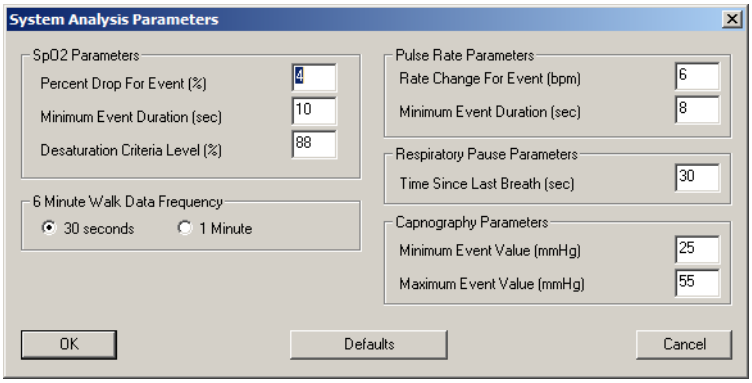
Analysis Parameters

The nVISION system default parameters can be changed to reflect a facility’s protocol. Once changed, the parameters are applied to any new downloaded data set.

An event is determined by user-selected analysis parameters and occurs after the event criteria are met or exceeded.

- SpO_2 data are evaluated based on known patterns of desaturation occurrences. The data might not be marked as an event if the desaturation is gradual (e.g., longer than 2 minutes in duration).
- Pulse rate data are evaluated based on recorded trends. The current value is compared to the previous value to see if the event criteria are met or exceeded. In addition, if the trend is upward, 100 must be exceeded; if the trend is downward, the pulse rate must drop below 60 BPM (beats per minute).
- Respiration rate data are evaluated on the time interval since the last breath.

- Capnography data are evaluated on the minimum and maximum $EtCO_2$ values.



Section/Field	Description	nVISION Default
SpO_2 Parameters – Both Percent Drop for Event (%) and Minimum Event Duration (sec) criteria must be met in order for an event to be recorded.		
Percent Drop for Event (%)	Value, in %, to qualify as an SpO_2 desaturation event.	4%
Minimum Event Duration (sec)	Minimum duration that must be exceeded to qualify as an SpO_2 event.	10 seconds
Desaturation Criteria Level (%)	Value below which the SpO_2 level must drop to be classified as a desaturation event. Indicated by a red dashed guide line on the SpO_2 graph.	88%
6-Minute Walk Data Frequency		
30 seconds/1 minute	Sets data frequency for 6 Minute Walk report. Can be either 30 seconds or 1 minute.	30 seconds
Pulse Rate Parameters – Both Rate Change for Event (bpm) and Minimum Event Duration (sec) criteria must be met in order for an event to be recorded.		
Rate Change For Event (bpm)	Value, in beats per minute, to qualify as a pulse rate event.	6 BPM
Minimum Event Duration (sec)	Minimum duration that must be exceeded to qualify as a pulse rate event.	8 seconds
Respiratory Rate Parameters – Criteria for marking a respiration pause event (time between breaths).		
Time Since Last Breath (sec)	Value, in seconds, since last breath to qualify as a respiratory pause event.	30 seconds
Capnography Parameters		
Minimum Event Value (mmHg) (millimeters of mercury)	Minimum CO_2 value, in mmHg, to qualify as a capnography event. Displays on the capnography data chart as a blue dashed line.	25 mmHg
Maximum Event Value (mmHg)	Maximum CO_2 value, in mmHg, to qualify as a capnography event. Displays on the capnography data chart as a red dashed line.	55 mmHg

Setting System Analysis Parameters

1. Close any open data set.
2. Click **Options > Analysis Parameters**. The System Analysis Parameters dialog box opens.
   a. To set the values to the nVISION default settings, click **Defaults.**
   b. To change the values, click in any box. Change values as needed.
3. To save changes, click **OK**. Click Cancel to close the dialog box without saving changes.

NOTE: The System Analysis Parameters are saved with a case when data are downloaded and saved.

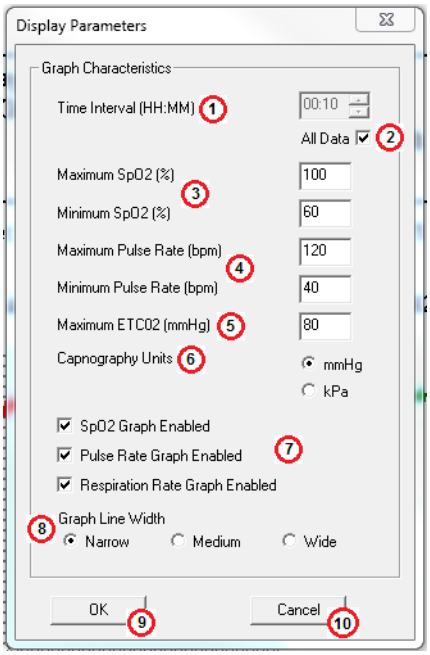
Setting Case-Specific Analysis Parameters

1. Open a data set.
2. Click **Options > Analysis Parameters**. Case Specific Analysis Parameters dialog box displays. The values displayed may be the system analysis parameters or they may be parameters that were set by a user and saved with the case.
3. To change the values, click in any box. Change values as needed. When finished:
   - Click **OK** to save changes made to the case-specific analysis parameters. The dialog box closes. The analysis parameters are not saved with the data set unless the file is saved using Save or Save As.
   - Click **Defaults** to reset the parameters to the System Analysis Parameters. The dialog box closes. The analysis parameters are not saved with the data set unless the file is saved using Save or Save As.
   - Click **Cancel** to close the dialog box without saving changes.

Display Parameters

Display parameters are graph characteristics that are set up or modified to obtain desired report outputs. The Display Parameters dialog box allows the user to select how much time will display in the nVISION window and adjust the range of values for SpO_2, pulse rate, or respiration rate on the y-axis.

To open the Display Parameters dialog box, click **Options > Display Parameters** or the Display Parameters icon .



No.	Description
1	Time Interval (HH:MM) – Time interval is the Display time that is in the lower left corner of the nVISION window's status bar (see "Status Bar" on page 6). Time Interval is the amount of data that displays on a single screen or on one printed page of the Strip Chart and Full Study reports. Decreasing the Time Interval allows for greater data resolution. This field is grayed out if All Data is checked. To set a time interval, deselect "All Data" and then either type a time interval (HH:MM) or use the up/down arrows (5 minute increments) to select the desired interval.
2	All Data – When checked, the x-axis automatically adjusts so that all data fits on the screen when viewed with the Strip Chart report or printed with the Full Study report (in some cases, up to 5 minutes of data may be off screen). The Time Interval [HH:MM] option is disabled.
3	Maximum SpO_2 (%) – Upper limit on the y-axis of the SpO_2 graph. Minimum SpO_2 (%) – Lower limit on the y-axis of the SpO_2 graph.
4	Maximum Pulse Rate (bpm) – Upper limit on the y-axis for the pulse rate graph. Minimum Pulse Rate (bpm) – Lower limit on the y-axis for the pulse rate graph.
5	Maximum ETCO2 (mmHg) – Upper limit on the y-axis of the capnography data graph.
6	Capnography Units – Select units for displaying capnography data.
7	Check boxes to enable or disable the SpO_2, Pulse Rate, and Respiration Rate graphs on the Oximetry, Strip Chart, Full Study, or Summary reports.
8	Graph Line Width – The width of the line used in graphs. Narrow provides the most data resolution; the other widths are useful when faxing reports.
9	OK button – Saves changes and closes the dialog box. Changes are recalled the next time nVISION is opened.
10	Cancel button – Closes the dialog box without saving changes.

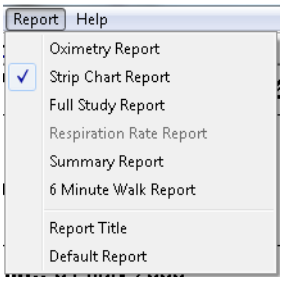
Language

The Language feature allows the user to change the language used in reports and menus.

1. Click **Options > Language** or the Language icon .
2. In the Language dialog box, select a language.
3. Click **OK** to save.

Report Menu

The Report Title dialog box and six reports are available through the Report pull-down menu:



- Oximetry (default) — see “Oximetry Report (Default Report)” on page 29
- Strip Chart — see “Strip Chart Report” on page 32
- Full Study — see “Full Study Report” on page 33
- Respiration Rate — see “Respiration Rate Report” on page 34
- Summary — see “Summary Report” on page 36
- 6-Minute Walk — see “6-Minute Walk Report” on page 39
- Report Title — see “Report Title” on page 28
- Default Report — see “Default Report” on page 28

Only one report type may be selected at a time. In the Report Menu, the current report type has a check mark next to the name.

NOTE: In order for stored data to correlate to a 24-hour clock, the time and date must be set in the oximeter before recording patient data. If time and date are not set before recording data, nVISION automatically assigns the time and date set in the PC at the time of download as the study time.

nVISION Reports

Report Features

The heading for each report contains the following information:

- Report title prints in the upper left corner of each page.
- Patient data prints below the report title
- Date and time information associated with the report prints below the patient data.
- Comments entered into the Patient History File print below the date/time.

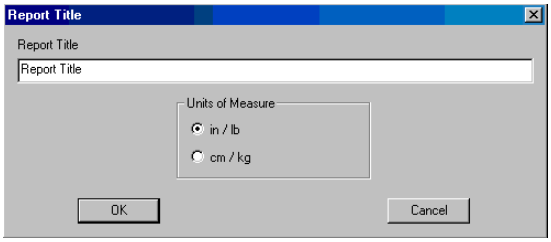
In the graphs that display in the reports:

- SpO_2 data displays in green on the SpO_2 graph. Gray, dashed guidelines are spaced every 10 percent. Guidelines are spaced every 5 percent if the minimum and maximum SpO_2 values are 20% apart.
- Pulse rate data displays in blue on the pulse rate graph. Gray, dashed guidelines are spaced every 10 BPM. Guidelines are spaced every 20 BPM if the minimum and maximum pulse rate values are >100 BPM apart.
- Respiratory rate data displays in violet on the Respiration Rate report. Gray, dashed guidelines are spaced every 10 BPM.

Report Title

The Report Title dialog box allows the user to customize the title (e.g., hospital/medical facility name) that prints at the top of reports.

1. Click **Report > Report Title**.
   - Enter report title.
   - Click **OK** to save changes. Dialog box closes.
   - Click **Cancel** to close the dialog box without saving changes.

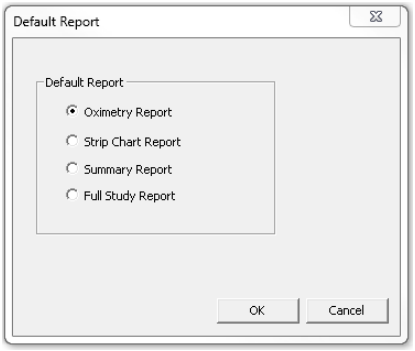


Default Report

The Default Report dialog box allows the user to select a default report other than the Oximetry Report.

1. Click **Report > Default Report**.
2. Select the preferred default report.
   - Click **OK** to save selection. Dialog box closes.
   - Click **Cancel** to close the dialog box without saving the selection.

NOTE: nVISION must be restarted for this change to take effect.



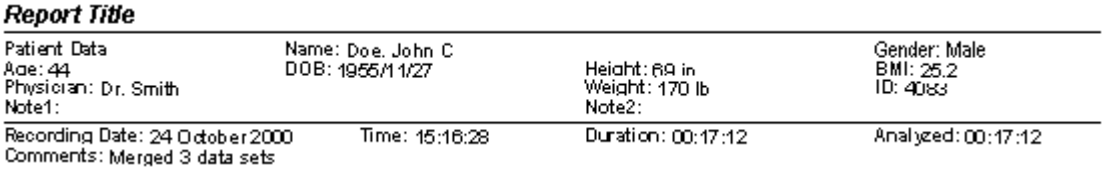
Units of Measure

The Report Title dialog box allows the user to select the units of measure (in./lb or cm/kg) for height/weight in patient information.

1. Click **Report > Report Title**.
2. Select units of measure.
   - Click **OK** to save changes. Dialog box closes.
   - Click **Cancel** to close the dialog box without saving changes.

Report Heading Field Descriptions

On all reports, patient data and the report's time details display below the report title.



Field	Description
Patient Data	Patient information block – includes name, gender, age, date of birth (DOB), height, weight, BMI (body mass index), physician, ID, and notes. BMI is a determined by height and weight. BMI = weight (kg)/height (m)2. The height/weight units of measure are set through Report > Report Title.
Recording Date	The date the data was recorded.
Time	The time the recording began (as determined by the clock set in the device) in hours, minutes, seconds (HH:MM:SS). If time and date are not set before recording data, nVISION automatically assigns the time and date set in the PC at the time of download as the study time.
Duration	Total study time (HH:MM:SS).
Analyzed	Total study time with excluded data subtracted (HH:MM:SS). (Duration - Excluded Time = Analyzed Time)
Comments	Imported from the patient information file that is associated with the data set.

Oximetry Report (Default Report)

The Oximetry report is an overview that provides a one-page data summary of the patient's SpO_2 and pulse rate during the monitoring period. The Oximetry report focuses on event data as defined by the analysis parameters.

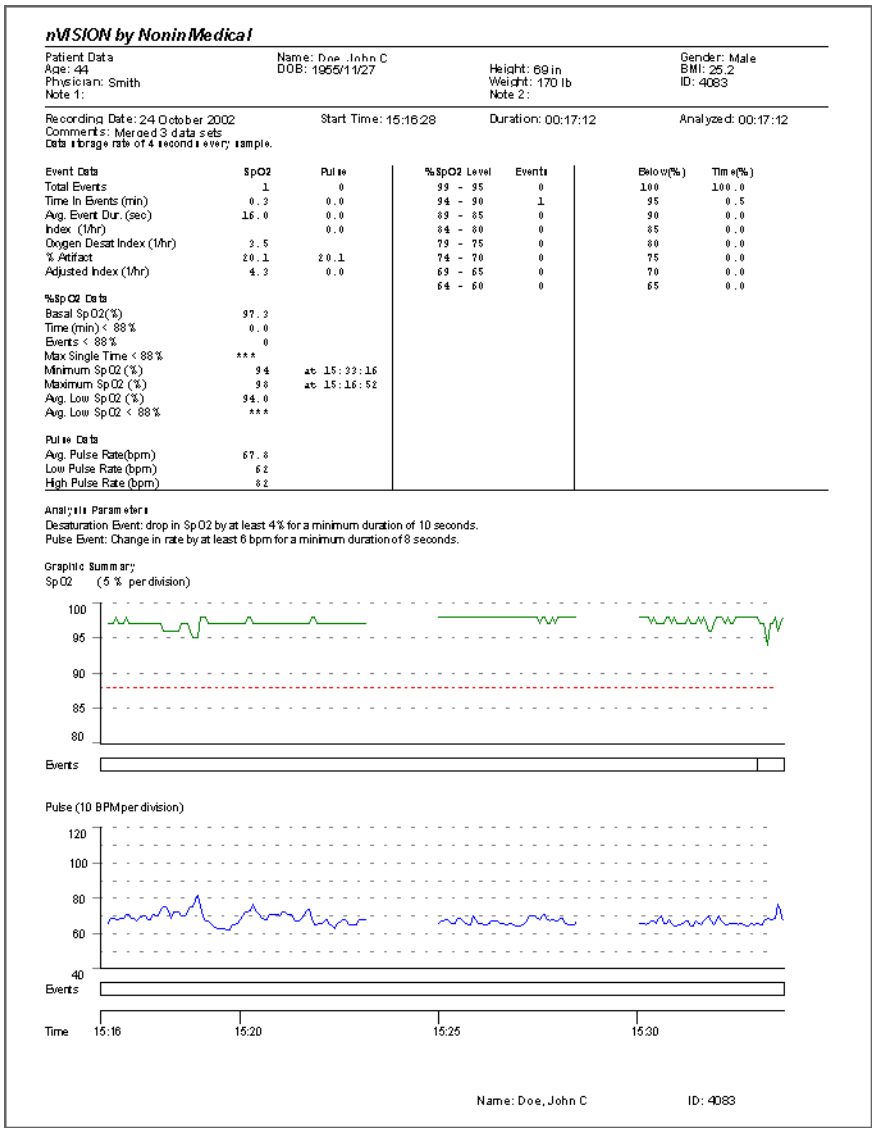
Excluded segments display in the graphs with a crosshatched pattern.

In addition to the report heading, the report has these sections:

- **Numerical Data Summary** – Data storage rate, detailed event, %SpO_2, and pulse rate data.
- **Analysis Parameters** – Parameters used to analyze the data set and calculate and report events.
- **Graphic Summary** – Includes SpO_2 data, SpO_2 events, pulse rate data, pulse rate events, and time. Events are indicated with black vertical lines below each chart. A red dashed guide line on the SpO_2 graph indicates the desaturation criteria level (Edit > Analysis Parameters). SpO_2 summary histograms display at the bottom of the report.
  - % Time spent at SpO_2 level – the percent time distribution at a given SpO_2 level over the monitoring period. The y-axis is labeled % Time and the x-axis is labeled SpO_2 value (100 – 30%).
  - SpO_2 events by SpO_2 level, in 5% increments. The y-axis is the number of events and the x-axis is labeled SpO_2 value (100 – 30%).

See "Display Parameters" on page 25 for more information about changing the appearance of the report.

Example: Oximetry Report



nVISION by Nonin Medical

Patient Data
Age: 44
Physician: Smith
Note 1:

Name: Doe, John C
DOB: 1955/11/27

Height: 69 in
Weight: 170 lb
Note 2:

Gender: Male
BMI: 25.2
ID: 4083

Recording Date: 24 October 2002
Comments: Merged 3 data sets
Data storage rate of 4 second(s) every sample.

Start Time: 15:16:28

Duration: 00:17:12

Analyzed: 00:17:12

Event Data	SpO2	Pulse
Total Events	1	0
Time In Events (min)	0.3	0.0
Avg. Event Dur. (sec)	16.0	0.0
Index (1/hr)		0.0
Oxygen Desat Index (1/hr)	3.5	
% Artifact	20.1	20.1
Adjusted Index (1/hr)	4.3	0.0

%SpO2 Data	
Basal SpO2(%)	97.2
Time (min) < 88%	0.0
Events < 88%	0
Max Single Time < 88%	***
Minimum SpO2 (%)	94 at 15:33:16
Maximum SpO2 (%)	98 at 15:16:52
Avg. Low SpO2 (%)	94.0
Avg. Low SpO2 < 88%	***

Pulse Data	
Avg. Pulse Rate(bpm)	67.8
Low Pulse Rate (bpm)	62
High Pulse Rate (bpm)	82

%SpO2 Level	Events	Below(%)	Time(%)
99 - 95	0	100	100.0
94 - 90	1	95	0.5
89 - 85	0	90	0.0
84 - 80	0	85	0.0
79 - 75	0	80	0.0
74 - 70	0	75	0.0
69 - 65	0	70	0.0
64 - 60	0	65	0.0

Analysis Parameters
Desaturation Event: drop in SpO2 by at least 4% for a minimum duration of 10 seconds.
Pulse Event: Change in rate by at least 6 bpm for a minimum duration of 8 seconds.

Graphic Summary
SpO2 (5 % per division)

100
95
90
85
80
Events

Pulse (10 BPM per division)

120
100
80
60
40
Events

Time 15:16 15:20 15:25 15:30

Name: Doe, John C ID: 4083

Oximetry Report Field Descriptions

Field	Description
Data Storage Rate	Rate at which the data was stored in the oximeter (e.g., once per second, once every 2 seconds, once per 4 seconds).
Event Data	Heading for event data section.
Total Events	Total number of events during any measured time period.
Time in Events (min)	Sum of time durations for all events.
Avg. Event Dur. (sec)	Average event duration, which is average time in seconds per event.
Index (1/hr)	A sleep study statistic, calculated as events per hour. This is the “raw” index value for pulse only.

Field	Description
Oxygen Desat Index (1/hr)	A sleep study statistic, calculated as events per hour. The number of times per hour that the SpO_2 dropped by a certain degree from the baseline.
% Artifact	Percent of time data were missing or excluded. Example, if the study is 6 hours and 1 hour is determined to be artifact, the % Artifact is calculated as follows: 1/6 = 16%
Adjusted Index (1/hr)	A sleep study statistic, calculated as events per hour of “analyzed data” (artifact and excluded data are not included). Adjusted Index = Number of events / non-artifact time (hours). Example, if a patient’s recording contains 300 events over a recording period of 4 hours and 1 hour of data is excluded, the Adjusted Index is calculated as follows: 300/3 = 100 (events/hour)
$\%SpO_2$ Data	Heading for $\%SpO_2$ data section.
Basal SpO_2 (%)	Steady-state SpO_2. The average of the SpO_2 readings that are not included in any desaturation event.
Time (min) <88%	Amount of time during the study that the SpO_2 reading was below 88%.
Events <88%	Number of events captured during the study when the SpO_2 reading was below 88%.
Max Single Time <88%	Longest single time during the study that the SpO_2 reading was below 88%.
Minimum SpO_2 (%)	Lowest single SpO_2 value seen.
Avg. Low SpO_2 (%)	Average of lowest SpO_2 seen over all events.
Avg. Low SpO_2 <88%	Average of all SpO_2 values that were below 88%.
Pulse Data	Heading for pulse rate data section.
Avg. Pulse Rate (bpm)	Average of all pulse rate values during the study.
Low Pulse Rate (bpm)	Single lowest pulse rate during the study.
$\%SpO_2$ Level/ Events	Shows the number of events occurring in each 5-percentage point interval from 30% to 100%.
Below(%)/ Time(%)	Shows the cumulative percent of time spent below each 5-percentage point interval from 30% to 100%.
Analysis Parameters	The parameters used to define the criteria by which events are detected and reported.
Graphic Summary	Includes SpO_2 and pulse rate graphs along with an event bar below each graph. The event bar indicates where events occurred when the analysis parameters were applied.

Strip Chart Report

The Strip Chart report is used to view, analyze, and edit data. The Strip Chart report allows the user to view raw data as a visual strip chart recording. The user can then evaluate the data and perform the necessary analysis to exclude artifact (corrupt or meaningless data) and to select the scales for printing a Full Study report.

Excluded segments display in the graphs with a crosshatched pattern.

In addition to the report heading, the report has this section:

Graphic Summary – Provides a detailed graphical representation of SpO_2, pulse rate, respiration rate data (when applicable), and time. Events are indicated with black bars above the data in each respective graph. A red dashed guide line on the SpO_2 graph indicates the desaturation criteria level (an analysis parameter). Artifact data are seen as a gap in the graph (rather than going to zero) so it is not interpreted as an event.

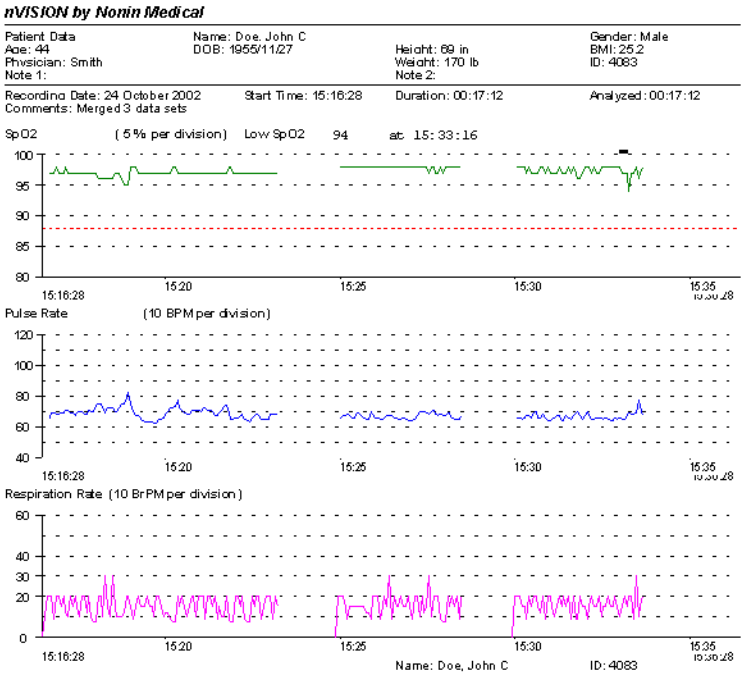
NOTE: The Strip Chart report prints one page of on-screen data and provides users with a method for documenting specific data sections.

See “Display Parameters” on page 25 for more information about changing the appearance of the report. Decreasing the Time Interval allows for greater data resolution on this report.

See “Summarize Data” on page 13 for more information about viewing the summary statistics for marked data.

NOTE: The lowest SpO_2 value is displayed above the SpO_2 graph.

Example: Strip Chart Report



Full Study Report

The Full Study report graphically shows all of the recorded data. This report may be more than one page long, depending upon the duration of the recording and time interval selected in the Display Parameters dialog box.

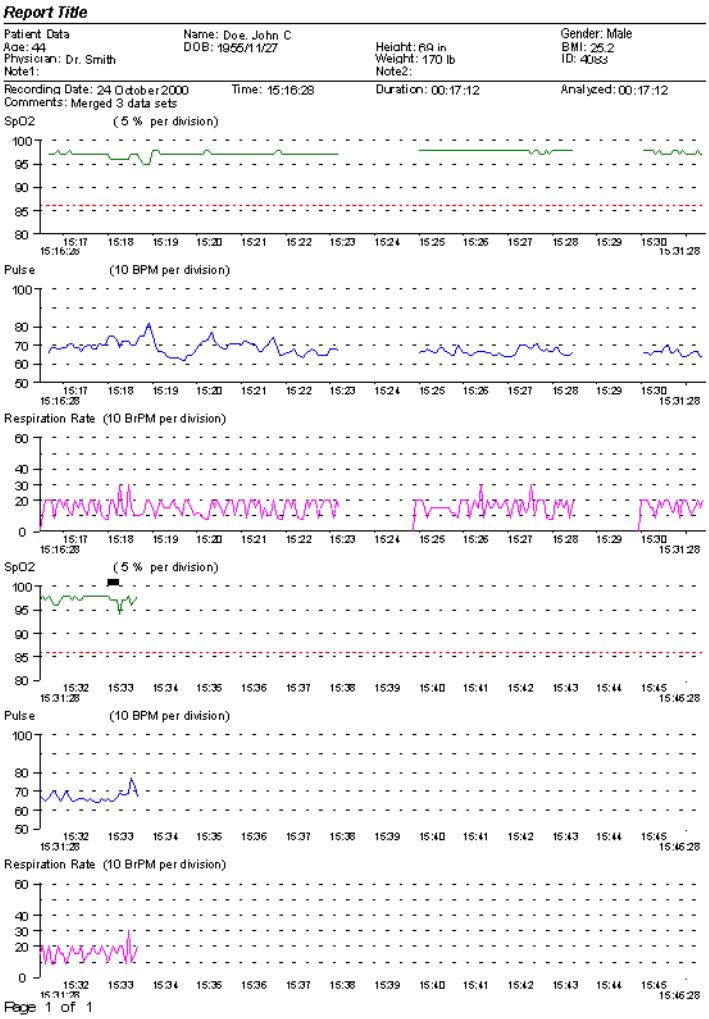
Excluded segments display in the graphs with a crosshatched pattern.

In addition to the report heading, the report has this section:

Graphic Summary – displays horizontally and provides a detailed graphical representation of SpO_2, pulse rate, respiration rate data (when applicable), and time. A red dashed guide line on the SpO_2 graph indicates the desaturation criteria level (an analysis parameter). Events are indicated with black bars above the data in each respective graph.

Decreasing the Time Interval allows for greater data resolution on this report. See “Display Parameters” on page 25 for more information about changing the appearance of the report.

Example: Full Study Report



Respiration Rate Report

The Respiration Rate report provides respiration rate and capnography data for the patient during the monitoring period. The Respiration Rate report is only available when respiration data has been recorded.

Respiration rate is the time interval since the previous breath occurred, and is calculated as breaths per minute (BrPM) (i.e., 60 seconds divided by the interval (in seconds) since the last breath). To respond quickly to changes in patient status, this measurement is a breath-by-breath averaging.

Capnography is the monitoring of the concentration or partial pressure of carbon dioxide (CO_2) in the respiratory gases. The Respiration Rate report has a capnography data graph if capnography data has been downloaded into nVISION.

NOTE: All capnography data display in mmHg. Data collected in kPa (kilopascals) are converted to mmHg during the download.

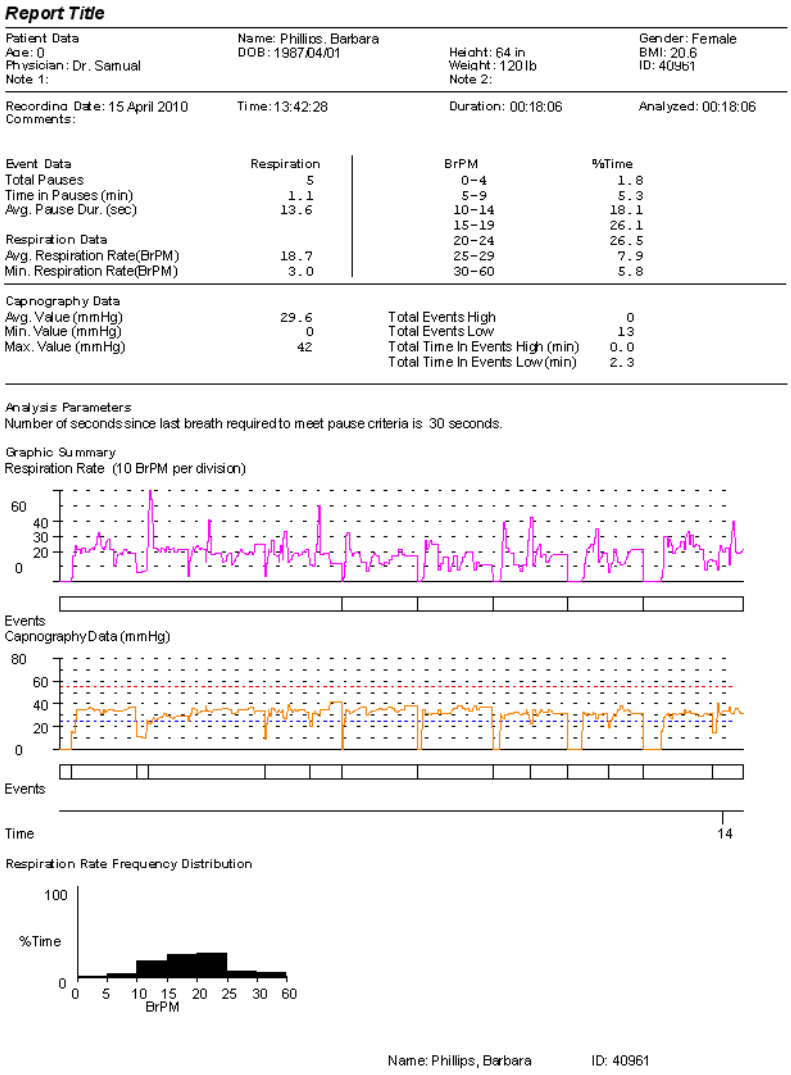
In addition to the report heading, the report has these sections:

- **Numerical Data Summary** – Detailed event data, respiration data, and capnography data (when available).
- **Analysis Parameters** – Parameters used to analyze the data set and calculate and report events.
- **Graphic Summary** – Includes respiration rate, respiration rate events, capnography data, capnography events. Events are indicated with black vertical lines below each chart. Below the timeline is a bar graph displaying the respiration rate frequency distribution.

See “Analysis Parameters” on page 22 for more information on setting respiratory pause and capnography parameters.

See “Display Parameters” on page 25 for more information on setting the maximum value for the capnography graph y-axis.

Example: Respiration Rate Report



Report Title

Patient Data Age: 0 Physician: Dr. Samual Note 1:	Name: Phillips, Barbara DOB: 1987/04/01	Height: 64 in Weight: 120 lb Note 2:	Gender: Female BMI: 20.6 ID: 40961
Recording Date: 15 April 2010 Comments:	Time: 13:42:28	Duration: 00:18:06	Analyzed: 00:18:06

Event Data	Respiration	BrPM	%Time
Total Pauses	5	0-4	1.8
Time in Pauses (min)	1.1	5-9	5.3
Avg. Pause Dur. (sec)	13.6	10-14	18.1
		15-19	26.1
Respiration Data		20-24	26.5
Avg. Respiration Rate(BrPM)	18.7	25-29	7.9
Min. Respiration Rate(BrPM)	3.0	30-60	5.8

Capnography Data			
Avg. Value (mmHg)	29.6	Total Events High	0
Min. Value (mmHg)	0	Total Events Low	13
Max. Value (mmHg)	42	Total Time In Events High (min)	0.0
		Total Time In Events Low (min)	2.3

Analysis Parameters
Number of seconds since last breath required to meet pause criteria is 30 seconds.

Graphic Summary
Respiration Rate (10 BrPM per division)

Events
Capnography Data (mmHg)

Events

Time 14

Respiration Rate Frequency Distribution

Name: Phillips, Barbara ID: 40961

Respiration Rate Report Field Descriptions

Field	Description
Event Data	Summary of respiratory pause data, including total pauses, time in pauses in minutes, and average pause duration in seconds.
Respiration Data	Avg. Respiration Rate (BrPM) – Average breaths per minute (BrPM) recorded during the data set Min. Respiration Rate (BrPM) – Lowest single respiration rate value seen.
Capnography Data	Includes the average, minimum and maximum CO_2 values (in mmHg) for the data set. To the right of the of the mmHg values, the capnography event data displays.
Analysis Parameters	Parameters used to define the criteria by which events are detected and reported.

Field	Description
Graphic Summary	Includes respiration rate and capnography graphs along with an event bar below each graph. In the capnography data graph, the orange dashed line is maximum CO_2 event value (mmHg) and the blue dashed line is minimum CO_2 event value (mmHg).
Respiration Rate Frequency Distribution	Bar graph with respiration rate frequency.

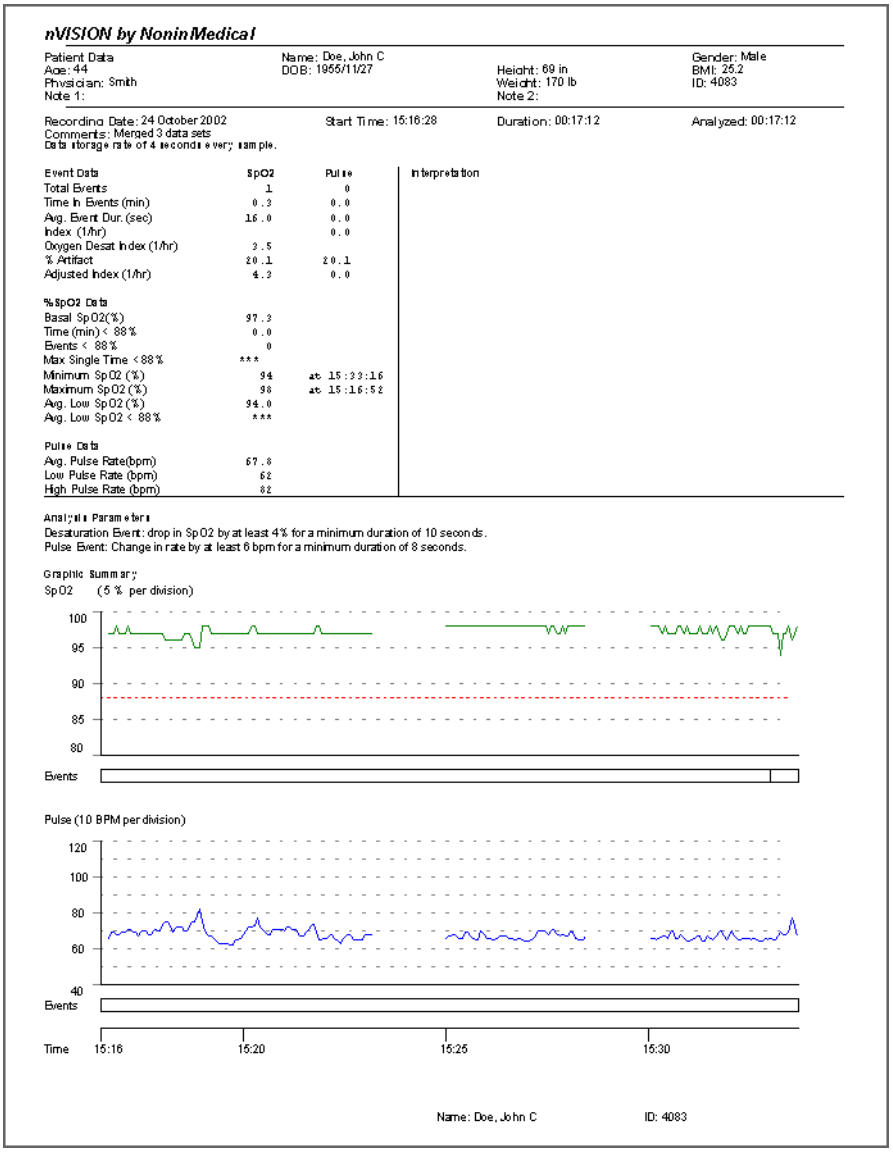
Summary Report

The Summary report is a one-page summary that focuses on event data as defined by the case-specific analysis parameters.

In addition to the report heading, the report has these sections:

- **Numerical Data Summary** – Data storage rate and detailed event, %SpO_2, and pulse rate data.
- **Interpretation Area** – Space for entering comments.
- **Analysis Parameters** – Parameters used to analyze the data set and calculate and report events.
- **Graphic Summary** – Includes SpO_2 data, SpO_2 events, pulse rate data, pulse rate events, and time. Events are indicated with black vertical lines below the timeline. A red dashed guide line on the SpO_2 graph indicates the desaturation criteria level (an analysis parameter).
- **Physician Signature Block** – Used for insurance and record-keeping purposes.

Example: Summary Report



Summary Report Field Descriptions

Field	Description
Data Storage Rate	Rate at which the data was stored in the oximeter.
Event Data	Heading row for the event data block.
Total Events	Total number of events during any measured time period.
Time in Events (min)	Sum of time durations for all events.
Avg. Event Dur. (sec)	Average event duration, which is average time in seconds per event.

Field	Description
Index (1/hr)	A sleep study statistic, calculated as events per hour. This is the “raw” index value for pulse only.
Oxygen Desat Index (1/hr)	A sleep study statistic, calculated as events per hour. The number of times per hour that the SpO_2 dropped by a certain degree from the baseline.
% Artifact	Percent of time data were missing or excluded. Example, if the study is 6 hours and 1 hour is determined to be artifact, the % Artifact is calculated as follows: 1/6 = 16%
Adjusted Index (1/hr)	A sleep study statistic, calculated as events per hour of “analyzed data” (artifact and excluded data are not included). Adjusted Index = Number of events / non-artifact time (hours) Example, if a patient’s recording contains 300 events over a recording period of 4 hours and 1 hour of data is excluded, the Adjusted Index is calculated as follows: 300/3 = 100 (events/hour)
%SpO2 Data	Heading for %SpO_2 data section.
Basal SpO2 (%)	Steady-state SpO_2. The average of the SpO_2 readings that are not included in any desaturation event.
Time (min) <88%	Amount of time during the study that the SpO_2 reading was below 88%.
Events < 88%	Number of events captured during the study when the SpO_2 reading was below 88%.
Max Single Time < 88%	Longest single time during the study that the SpO_2 reading was below 88%.
Minimum SpO2 (%)	Lowest single SpO_2 value seen.
Avg. Low SpO2 (%)	Average of lowest SpO_2 seen over all events.
Avg. Low SpO2 <88%	Average of all SpO_2 values that were below 88%.
Pulse Data	Heading for pulse rate data section.
Avg. Pulse Rate (bpm)	Average of all pulse rate values during the study.
Low Pulse Rate (bpm)	Single lowest pulse rate during the study.
Interpretation	Space for reviewer comments. Open by double-clicking in the Interpretation field on the report.
Analysis Parameters	Parameters used to define the criteria by which events are detected and reported.
Graphic Summary	Includes SpO_2 and pulse rate graphs along with an event bar below each graph. The event bar indicates where events occurred when the analysis parameters were applied.

6-Minute Walk Report

The 6-Minute Walk report is a summary of all information related to a patient's 6-minute walk test.

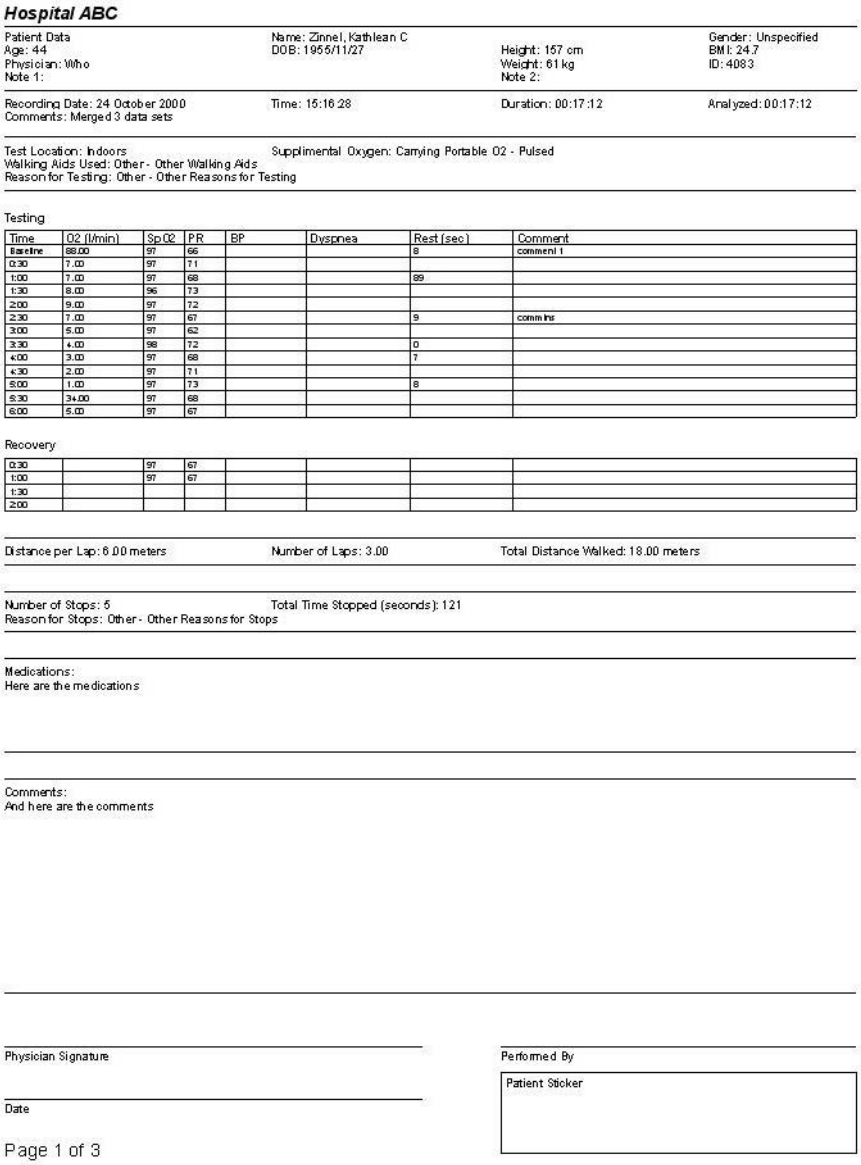
In addition to the report heading, the report has these sections:

- **Testing Details** – Includes the test conditions, test data, distance, and stop information.
- **Medication Area** – Space for entering patient medication information.
- **Comments Area** – Space for entering reviewer comments.
- **Physician Signature Block** – Used for insurance and record-keeping purposes.

Double clicking anywhere on the screen opens the 6 Minute Walk Information dialog box, which allows the user to enter data for all the fields that are not filled in by the oximetry data. All data is automatically saved when the dialog box closes.

nVISION only displays the first page of the report (see Example: 6-Minute Walk Report). However, when the report prints, the first page and all additional pages containing the oximetry data are printed.

Example: 6-Minute Walk Report



Hospital ABC

Patient Data
Age: 44
Physician: Who
Note 1:

Name: Zinnel, Kathlean C
DOB: 1955/11/27

Height: 157 cm
Weight: 61 kg
Note 2:

Gender: Unspecified
BMI: 24.7
ID: 4083

Recording Date: 24 October 2000
Comments: Merged 3 data sets

Time: 15:16:28

Duration: 00:17:12

Analyzed: 00:17:12

Test Location: Indoors
Walking Aids Used: Other - Other Walking Aids
Reason for Testing: Other - Other Reasons for Testing

Supplimental Oxygen: Carrying Portable O2 - Pulsed

Testing

Time	O2 (l/min)	Sp O2	P R	BP	Dyspnea	Rest (sec)	Comment
Baseline	88.00	97	66			8	comment 1
0:30	7.00	97	71				
1:00	7.00	97	68			89	
1:30	8.00	96	73				
2:00	9.00	97	72				
2:30	7.00	97	67			9	comm ins
3:00	5.00	97	62				
3:30	4.00	98	72			0	
4:00	3.00	97	68			7	
4:30	2.00	97	71				
5:00	1.00	97	73			8	
5:30	34.00	97	68				
6:00	6.00	97	67				

Recovery

0:30		97	67				
1:00		97	67				
1:30							
2:00							

Distance per Lap: 6.00 meters

Number of Laps: 3.00

Total Distance Walked: 18.00 meters

Number of Stops: 5
Reason for Stops: Other - Other Reasons for Stops

Total Time Stopped (seconds): 121

Medications:
Here are the medications

Comments:
And here are the comments

Physician Signature

Date

Performed By

Patient Sticker

Page 1 of 3

6-Minute Walk Report Field Descriptions

Field	Description
Test Location	Options include Indoors and Outdoors. Entered from the 6 Minute Walk Information dialog box.
Supplemental Oxygen	Drop-down menu in 6 Minute Walk Information dialog box. Options include Carrying Portable O_2, Pulling O_2 Cart, Staff Carrying Portable O_2, and Staff Pulling O_2 Cart.
Walking Aids Used	Drop-down menu in 6 Minute Walk Information dialog box. Options include None, Cane, Walker, and Other (allows user to enter a description).

Field	Description
Reason for Testing	Drop-down menu in 6 Minute Walk Information dialog box. Options include Exertional Dyspnea, Exercise-Induced Bronchospasm, Function Response to Change in Therapy, Pre/Post PR, and Other (allows user to enter a description).
Testing/Recovery block	Testing section – displays the SpO_2 and pulse rate at the selected interval (30 sec./1 min.) for the entire 6 minute test (set through Options > Analysis Parameters). Recovery section – displays the SpO_2 and pulse rate at selected interval for the 2 minute recover period. In the 6 Minute Walk Information dialog box, additional information (O_2 (l/min), Blood Pressure, Dyspnea, Rest (sec), Comment) can be entered for each interval.
Distance block	Distance per Lap (feet or meters) and Number of Laps is entered in the 6 Minute Walk Information dialog box. Total Distance Walked is automatically calculated when Distance per Lap and Number of Laps.
Stops block	Number of Stops is automatically calculated when rests are entered in the 6 Minute Walk Information dialog box. Reasons for Stops is a drop-down menu in 6 Minute Walk Information dialog box. Options include SOB (shortness of breath), Fatigue, Pain, Leg Cramp, and Other (allows user to enter a description). Total Time Stopped (seconds) is automatically calculated based on the times entered in the Rest (sec) column of the Testing block.
Medications	Entered from the 6 Minute Walk Information dialog box.
Comments	Entered from the 6 Minute Walk Information dialog box.
Physician signature block	Space for physician signature/date, name of person who performed the study, and a patient sticker.

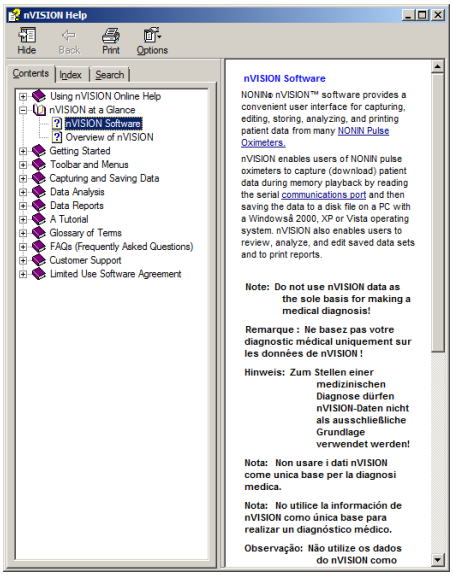
Help Menu

Help Topics

nVISION software includes an online Help System and a Glossary of Terms.

Using nVISION Help

1. Click **Help > Help Topics**. nVISION Help opens.
2. Help provides three options for finding information:
   - Contents tab shows the table of contents.
   - Index tab displays a list of topics and allows searching by keyword.
   - Find tab allows a full-text search of the Help Topics.



About nVISION

The About nVISION window displays information about nVISION software, including version number, the key code number, and registration information.

Click **Help > About nVISION** to open the About nVISION window.

NOTE: This key code is necessary for installing nVISION software and for obtaining customer support for the software.

Using nVISION

Creating Patient Identification Before Download (Recommended)

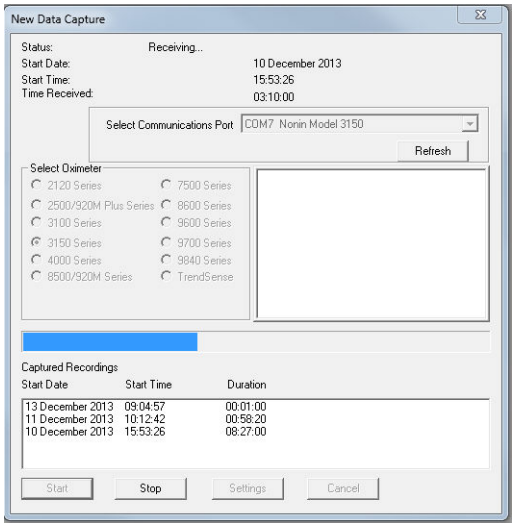
1. Click **Edit > Patient History File**. Patient History File dialog box opens.
2. To create a new patient, click **New**. A blank Edit Patient History File dialog box opens.
3. Enter the patient information. Complete required fields (first name, last name, and ID number).
4. When finished:
   - Click **Done**. Patient information updates and dialog box closes.
   - Click **Cancel**. Dialog box closes without saving changes.

Downloading Data

NOTE: Before downloading data for the first time, enter a report title and set the units of measure (**Report > Report Title**). See “Report Title” on page 28 for more information.

1. Connect a Nonin pulse oximeter or TrendSense module to the PC.
2. Open nVISION.
3. Click **File > New Data Capture** or the icon. New Data Capture dialog box displays.
4. In the Select Oximeter field, select the pulse oximeter model.
5. Select the communications port for the oximeter.
6. Follow the directions in the Status line or in the instruction box to initiate playback mode. Once in playback mode, the Select Oximeter, Start, and Cancel buttons are disabled and the Stop button is enabled.

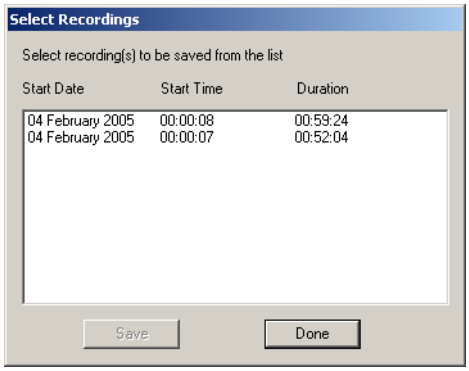
NOTE: If Start is clicked and the pulse oximeter is not in Playback mode, the Not In Playback Mode dialog box will display. Click **OK** to close.



7. While the oximeter or TrendSense module downloads patient data to the PC:
   - Status line messages display as data is received.
   - Progress bar shows the percent complete of the data transfer.
   - Captured Recordings box displays the Start Date, Start Time, and Duration for each downloaded data set.
   - Click **Stop** to end the download. If no complete data sets have been captured, the main nVISION window displays.

NOTE: If nVISION does not receive any files, verify the communications port is correct and that Start was clicked.

8. When data sets have been downloaded, the Select Recordings dialog box displays the Start Date, Start Time, and Duration for each downloaded data set.
   - Data segments are not saved until they are associated with a patient history file and saved as a .nmi file.



9. Click on and highlight the recording(s) to save. nVISION allows users to select multiple recordings to be saved as one data file.
   - If the clock was not set, a 10-minute interval appears between data sets, and the time between recordings is marked as excluded.

10. Click **Save**. Patient History File dialog box displays (see “Patient Info” on page 16 for more information).
    a. Existing patient – click the patient’s name and **OK**. Save Data Set dialog box displays with the selected patient’s information. Update as needed. For more information, see “Saving Data Sets — Existing Patient with Patient History” on page 45.
    b. New patient – click **New**. A blank Save Data Set dialog box opens. At minimum, complete first name, last name, and ID number. For more information, see “Saving Data Sets — New Patient Without Patient History” on page 44.
11. In the Save Data Set dialog box, click **Save**. The data set is saved to the default directory with an automatically-generated file name.

NOTE: The file name for storing the data set includes the patient name, recording date, and recording time. Changes to the generated file name are not allowed during data download.

12. The Select Recordings dialog box automatically closes if all data sets have been saved. If additional data sets remain, the Select Recordings dialog box displays again; however, the recently saved data set is not listed in the dialog box.
13. Repeat steps 9-11 until all desired recordings have been associated with a patient and saved.
14. Click **Done**. If Done is clicked, but not all of the data sets have been saved, the “OK to skip remaining recording(s)” dialog box displays.
    - Click **Yes** to return to the main nVISION window. All unsaved data segments are erased from nVISION.
    - Click **No** or **Cancel** to return to the Select Recordings dialog box.
15. Turn off the oximeter.

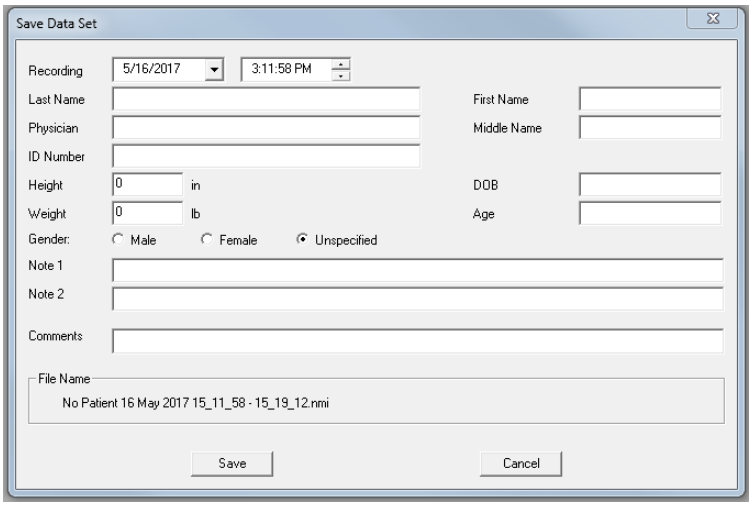
Model-Specific Data Download Information

3150 – Data sets that were recorded with different sample rates cannot be merged. After selecting the first data set, only data sets that have the same sample rate can be selected.

Saving Data Sets — New Patient Without Patient History

The Save Data Set dialog box provides space to enter patient information that will be associated with the specific data set(s) selected in the Downloading Data procedure.

NOTE: The data set date/time stamp is automatically entered in the Recording field. The file name includes patient name, date, and time of the recording. As text is entered, the file name updates. If the oximeter’s date and time are not set, nVISION prevents multiple files with identical names by using the date and time set in the PC when the data were downloaded.

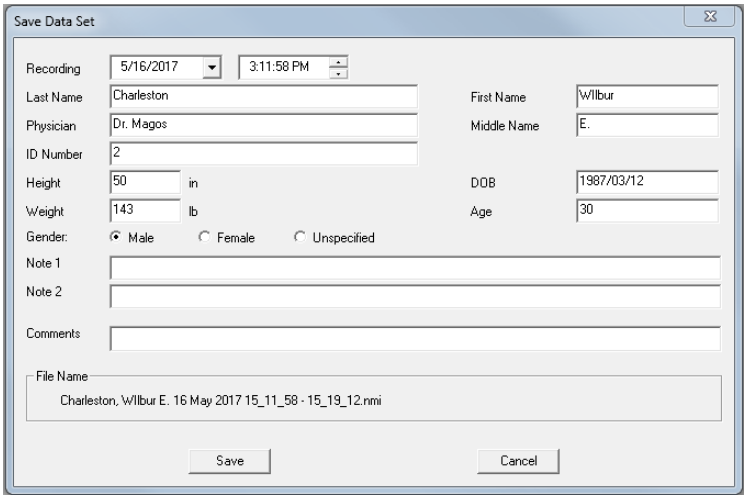


In each box, enter patient information –– Last Name, First Name, Middle Name, Physician, ID Number, Height, Weight, Gender, and DOB (Date of Birth). When a DOB is entered, nVISION automatically calculates the patient's age using the computer's current system date. If desired, enter text in Note 1, Note 2, or Comments. See "Patient Info" on page 16 section for field descriptions.

Saving Data Sets — Existing Patient with Patient History

For existing patients, the Save Data Set dialog box displays with complete patient information except for the Comments field. The Comments field allows a unique text string to be associated with the data set.

NOTE: Note 1 and Note 2 originate from the patient history file, but they can be changed within a specific patient record when that record is open and is stored as part of the downloaded recording. Changing Note 1 and Note 2 does not change the Patient History File.



Editing and Analyzing the Data

Analyzing data is primarily a task of adjusting parameters so the resulting event determination and statistics make sense. Use the Display Parameters command to change the data resolution

and to print specific patient data, and use the Analysis Parameters command to set the desired event-marking criteria.

1. Open a saved data set (**File > Open Saved Data**). The file opens as an Oximetry report.
2. Adjust the Display Parameters (**Options > Display Parameters**) to desired values in order to format the report that will be printed.
   a. If needed, disable All Data.
   b. Edit the other graph characteristics to expand or contract the scale in order to more accurately assess points of artifact.
3. Click **OK** to save changes.
4. Change report view to the Strip Chart report.
5. Identify and exclude artifact data.
   a. Place the cursor on any graph point. Right-clicking displays the time of the graph point and data values at bottom right of window.
   b. Use the scroll button, arrow keys, or Page Up/Page Down keys to navigate through the data.
   c. Select areas of interest. Click inside the area of interest to see the selected time interval in the status bar.
   d. To review the summary statistics for the enclosed area, click **Edit > Summarize Data** or click . Summary Statistics dialog box displays.

NOTE: The Summary Statistics dialog box displays respiratory rate (RespRate) data even if it is not displayed on screen if this data is part of the saved data set file.

   e. Click **Exclude** to accept the data selection. Click **Cancel** to return to the displayed Strip Chart report.
   f. To exclude data, click **Edit > Exclude Data** or the icon. Click **OK** to save the excluded data segment. The area is now marked with a crosshatched pattern.
   g. Undo any or all selected data sequences by clicking Undo or Undo All in the Exclude Data dialog box.
6. After excluding artifact, click **File > Save or File > Save As** to save the edits to the raw data.

Report Considerations

You can see the effects of adjusted parameters by reviewing the Oximetry report.

1. Open a saved data set (**File > Open Saved Data** or). The Oximetry report automatically opens.
2. Select Display Parameters and edit the data to exclude artifact.
3. Under the Oximetry report's event data section, the Index (1/hr) number is the most important value because events per hour are used as a diagnostic aid. The Adjusted Index (1/hr) number is calculated after excluded data are removed from the analysis.
4. If new case-specific analysis parameters were used, the user may wish to save the recording again or save it as a new recording (using **File > Save As**).

Tutorial

Sample data sets (patient case studies) are provided for so you can practice using nVISION. This tutorial uses one sample data set.

1. Open nVISION.
2. Click **File > Open Saved Data** to access the sample data sets.
3. Select “Miller, GT 30 Apr 2000 23.57.09-06.14.17.nmi.”
4. Click **Open**. Data set opens as an Oximetry report.

Using the Strip Chart Report to Analyze Data

1. To prepare the data for analysis, click **Report > Strip Chart Report**. The Strip Chart report provides:
   - Graphical representations of data (e.g., SpO_2 and pulse rate). Time is indicated on each graph’s x-axis.
   - Events are black marks above the data in each graph. nVISION calculates events by applying user-selected, case-specific analysis parameters.
   - Display time is located in the lower left corner of the status bar. Display time is the amount of time set in the Time Interval (HH:MM) field of the Display Parameters screen.
   - Elapsed time is located in the center of the status bar. The elapsed time updates as you scroll through the report (use the arrow keys or the scroll bar).
   - Either Cursor time or Selected time is located on the right side of the status bar.
     - Cursor time: Right click on a data graph to display data SpO_2 and pulse values.
     - Select time: When a segment is marked, the start time and length of the segment displays

NOTE: In order for stored data to correlate to a 24-hour clock, the time and date must be set in the oximeter before recording patient data. If time and date are not set before recording data, nVISION automatically assigns the time set in the PC at the time of download as the study time.

2. Scroll from the beginning to the end of the report. Use the arrow keys or the scroll bar.
3. For review purposes, we will analyze specific sections in greater detail. Click **Options > Display Parameters** or the Display Parameters icon . The settings for each display item appear.
4. Change the parameter values by highlighting the current numerical value in each box and entering the new value. Use the Tab key to move to the next field, or click in the field.
   a. De-select the All Data check box.
   b. In Time Interval field, enter **01:00**. The Time Interval indicates the amount of data (in hours and minutes) that will be displayed on the screen (in this case, 1 hour of data).
   c. In Maximum SpO2 (%) field, enter **98**.
   d. In Minimum SpO2 (%) field, enter **70**.
   e. In Maximum Pulse Rate field, enter **140**.
   f. In Minimum Pulse Rate field, enter **60**.
5. Click **OK**. Notice that two SpO_2 events and three pulse rate events display in the first hour of the study. (See “Analysis Parameters” on page 22 for more information about setting parameters.)

Excluding and Summarizing Data

An area of interest, indicated by a red, dashed-line rectangle, is drawn in the Strip Chart report and used to identify a specific block of data. Once identified, the user can review a statistical summary of the data within the rectangle and identify and select areas of artifact (corrupt or meaningless data) to exclude from the analysis.

NOTE: Excluded data are identified by a crosshatched pattern in graphs, but are not excluded from any report. The crosshatched pattern is removed when excluded data is cleared (not excluded). Excluded data are included in the calculation of % Artifact (Oximetry and Summary reports). Excluded data are not used in any other calculations on the Oximetry report. Analyzed Time has the excluded data subtracted from the Duration.

1. To create an area of interest, click and drag the mouse within one of the graphs. While the cursor is dragged, the boundaries of the selected area are marked with a dashed-line rectangle in each of the graphs. The rectangle boundaries move as the mouse is moved.
2. Click and hold the mouse within the pulse rate graph beginning at minute 6; release at minute 11.
3. Click **Edit > Summarize Data** or to obtain statistical summary information about the data. The statistical summary for the rectangle is shown and allows you to exclude data segment(s) from this dialog box. Click **Exclude > OK**.
4. Another way to exclude data segment(s) is by using the Exclude icon . Click and drag the mouse within the pulse rate graph beginning at minute 21 and releasing at minute 26. After creating the rectangle, click **Edit > Exclude Data**, or click and then **OK**.
5. To clear or undo the excluded data, click **Edit > Exclude Data** or .
6. In the Exclude Data Segments dialog box, click **Undo All** to undo all excluded data, or click on the desired data segment (for this example “00:06:01 – 00:11:01”). Notice the data segment is now highlighted. Click **Undo**.

Saving Data

To save changes made to a data set (i.e., any editing, changes to the analysis parameters, etc.), click **File > Save**. The case is saved and overwrites the previous data set.

To save these parameters as a separate data set, click **File > Save As** to save the data set with a new file name (to not overwrite the original data).

NOTE: If the data set is closed before saving the changes, the data set reverts to the most recently saved data.

Other Reports

See “nVISION Reports” on page 27 for information on the other types of nVISION reports.

- Oximetry — see “Oximetry Report (Default Report)” on page 29
- Full Study — see “Full Study Report” on page 33
- Respiration Rate — see “Respiration Rate Report” on page 34
- Summary — see “Summary Report” on page 36
- 6-Minute Walk — see “6-Minute Walk Report” on page 39

Technical Support

Nonin Medical, Inc.
13700 1st Avenue North
Plymouth, MN 55441, USA

Phone: +1-763-553-9968
Toll-Free: +1-800-356-8874 (U.S.A. and Canada only)
nonin.com

Technical Service

North America, Latin America, and Asia Pacific

email: technicalservice@nonin.com

Europe, Middle East, Africa, India, and the Indian Subcontinent
email: technicalserviceintl@nonin.com

NOTE: Nonin Technical Support will ask for the nVISION software key code, which is displayed in the About nVISION window and is also printed on the nVISION postcard mailer.

Limited Use Software Agreement

NONIN MEDICAL, INC. (“Licensor”) licenses the accompanying nVISION® Software and written material (the “Software”) to you, (the “Licensee”) only on the condition that you accept all of the terms and conditions set forth in this License Agreement. Please read these terms carefully because by opening the sealed postcard mailer, you are agreeing to be bound by the terms of this Agreement. If you do not agree with these terms, Licensor will not issue this license to you and you should promptly return this product and all packaging to NONIN MEDICAL, INC. and your license fee will be refunded.

1. LICENSE GRANT: NONIN MEDICAL, INC. hereby grants you a non-exclusive, nontransferable License to use one copy of nVISION® Software program (the “program”) on a single computer, subject to the terms and restrictions set forth in this Software License Agreement. You may not use the program on more then one terminal of a network, on a multi-user computer, on a time-sharing system, on a service bureau, or on any other system on which the Program could be used on more than one computer at any time.

2. RESTRICTIONS ON USE AND TRANSFER: This License gives the Licensee the right to make copies of the licensed Software solely for the following purposes: (a) For the exclusive use of the licensee identified on your nVISION® registration card, (b) For backup or archival purposes. Other than for the purposes outlined above, the Licensee may not reproduce, copy, distribute, sell, give, lend, transfer, or assign the Software, nor any part thereof, to any other person or entity, unless prior written permission is received from licensor. Furthermore, the Licensee may not, and shall not allow others to reverse engineer, decompile, or disassemble the Software.

3. OWNERSHIP: The enclosed Software and accompanying materials are, and remain, the sole and exclusive property of NONIN MEDICAL, INC. and are protected by US and international copyright laws. This License merely grants the Licensee the right to use the licensed Software according to the terms of this agreement.

4. LIMITED WARRANTY: Licensor warrants that the Software will perform substantially in accordance with the accompanying written materials for a period of 90 days from the date of Licensee’s receipt of the Software. The Licensor is not responsible for support, maintenance, training and proper use of monitoring devices and the interface equipment on which the NONIN MEDICAL, INC. Software is run and which may affect the performance of the Software. Accordingly, Licensor makes no warranty nor representation with respect to the accuracy and use of the Software.

IN NO EVENT SHALL LICENSOR BE LIABLE FOR ERRORS IN DIAGNOSIS OR PROGNOSIS NOR DAMAGES, INCLUDING ANY LOSS OF PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF LICENSEE’S USE OR INABILITY TO USE THE SOFTWARE. LICENSOR DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT.

Licensor’s entire liability and Licensee’s exclusive remedy shall be, at Licensor’s choice, either: (a) the return of the price paid or (b) replacement of the software that does not meet Licensor’s limited warranty and which is returned to Licensor with a copy of Licensee’s receipt. Any replacement Software will be warranted for the remainder of the original warranty period or 30 days, whichever is longer. This Limited Warranty is void if failure of the Software has resulted from modification, accident, abuse, or misapplication.

5. CLAIMS: Licensee agrees to hold harmless and indemnify Licensor, its Officers, Directors and Shareholders, in any case of alleged or proven medical misdiagnosis or malpractice. Should any controversy or claim arise out of or relate to this License, the parties agree to submit it to be settled by binding arbitration. The venue for all claims made under the Agreement shall be Minneapolis, Minnesota and in the event that any action, arbitration or proceeding is commenced to interpret or enforce the terms of this Agreement, the prevailing party shall be entitled to recover its actual attorney’s fees, costs and expenses.

6. ENTIRE AGREEMENT: This instrument contains the entire agreement of the parties hereto and any oral representations or modifications shall be of no force or effect unless contained in a subsequent written modification signed by both parties.

Should you have any questions concerning this agreement, you may contact NONIN MEDICAL, INC. as follows:

Nonin Medical, Inc.
13700 1st Avenue North
Plymouth, MN 55441 USA

nonin.com

Telephone: +1.763.553.9968

e-mail: technicalservice@nonin.com