

# ***Nursing Informatics: Pupillometer EMR Flowsheet Integration***



NEUR  PTICS

# Nursing Informatics:

## Pupillometer EMR Flowsheet Integration

The following information will be important to provide the hospital Nursing Informatics team charged with working with clinical staff to develop new and/or modify existing Electronic Medical Record (EMR) neurological parameter flowsheets for charting pupillary measurements as part of the neurological assessment.

### The NPi-200 Pupillometer and Pupillary Measurement Parameters

The NPi-200 Pupillometer provides accurate, reliable, and objective pupil size and reactivity data independent of examiner – removing variability and subjectivity. The Pupillometer expresses pupil reactivity **numerically** (see **The Neurological Pupil index™ [NPi®]** Scale below) so that now, for the first time, both pupil size and reactivity can be accurately trended for changes, just like other vital signs.

#### Recommended Pupillary Measurement Parameters for EMR Charting

Parameter	Description
Size = Maximum Diameter	Maximum pupil size before constriction
NPi = Neurological Pupil Index	Numerical value for pupil reactivity

#### The Neurological Pupil index™ (NPi®) Pupil Reactivity Assessment Scale

Measured Value*	Assessment
3.0 – 4.9	Normal/“Brisk”
< 3.0	Abnormal/“Sluggish”
0	Non-Reactive, Immeasurable, or Atypical Response

The most effective way to use the pupillometer is to establish the earliest possible **baseline** NPi and size measurements when the patient is admitted to the Intensive Care Unit or Emergency Department, and **trend for changes** over time via the hospital’s standard pupil assessment protocol.

Please note the pupillometer records a total of 8 Pupillary Measurement Parameters, and a select number of hospitals record parameter(s) in addition to NPi and Size. Please thoroughly read the Flowsheet Integration Instructions and Checklist on Page 2, as it will be important for your Nursing Informatics Team to work with the clinical staff to confirm which Pupillary Measurement Parameters need to be trended. Most facilities chart only NPi and Size as recommended above, but for more information on the other Pupillary Measurement Parameters, please see **Appendix B**.

### EMR Flowsheet Integration of NPi-200 Pupillary Measurement Parameters

**The hospital Nursing Informatics team plays a pivotal role in allowing the pupillometer to be used effectively to accurately baseline and trend quantitative reactivity (NPi) and size (measured precisely to the hundredths of a mm) in critical care patients.** The Pupillometer Display Limits for EMR Flowsheet Integration must be set such that NPi (scalar value to the tenth of a decimal – see below) and Size (to the hundredths of a mm – see below) are **numerical fields** included in the general Pupil Assessment section of a neurological parameter flowsheet, and that these fields can be accessed by the Providers that are notified in the event of an abnormal pupil measurement or trend.

In developing or modifying the hospital’s Electronic Medical Record (EMR) neurological parameter flowsheets for charting pupillary measurements, **please follow the instructions below and confirm that all steps in the included “Flowsheet Integration Checklist” have been completed.**

## Flowsheet Integration Instructions

1. Work with the clinical staff to determine which NPi-200 Pupillary Measurement Parameters need to be trended with each pupil assessment. If this isn't defined in the hospital pupillometry protocol, charting only Left & Right "NPi" and "Size" is recommended, as this allows for the simplest transition from charting and performing traditional manual pupil assessments to objective pupil assessments using the NPi-200 Pupillometer. **Please note** this is an important step, because adding parameters from Appendix B to the EMR Flowsheet that the clinical staff has not formally decided to trend, in addition to NPi and Size, can create confusion and be a significant barrier to nursing workflow and pupillometry adaptation.
2. Add fields in the general Pupil Assessment section of the neuro flowsheet for the above defined parameters. If only NPi and Size will be trended, add numerical fields (no additional free-type text should be entered) for Right NPi, Left NPi, Right Pupil Size, and Left Pupil Size with the following low and high display limits. It is critical that NPi is entered as a number to the 10th of a digit, and Pupil Size is entered as a number to the 100th of a mm. The Right eye measurements should be set up in the flowsheet to be entered before the Left eye measurements (i.e. Right above Left as seen in Appendix A), because this is the order of results on the Pupillometer when reading across the screen and will help to reduce transcription errors in the patient record. **Please see Appendix A (back page) for a visual example of Pupillometry flowsheet rows in Epic for NPi, Size, and Constriction Velocity included within the "Pupil Assessment" section and numerically restricted to the below defined low and high Pupillometer Display Limits.**
3. Optional (recommended): Allow for viewing of two trending charts (simple line graphs) for NPi and Size. The x-axis should be time of measurement, and the y-axis should be NPi (on a scale of 0-4.9) and Size in mm (on a scale of 1.00-10.00), respectively.

## Pupillometer Display Limits for Electronic Medical Record (EMR) Flowsheet Integration

The following low and high display limits are included to inform hospital staff of the specific parameter display limits for consideration in the development of neurological parameter flow sheets.

Parameter	LOW	HIGH
NPi	0.0	4.9
Size (mm)	1.00	10.00

## Flowsheet Integration Checklist

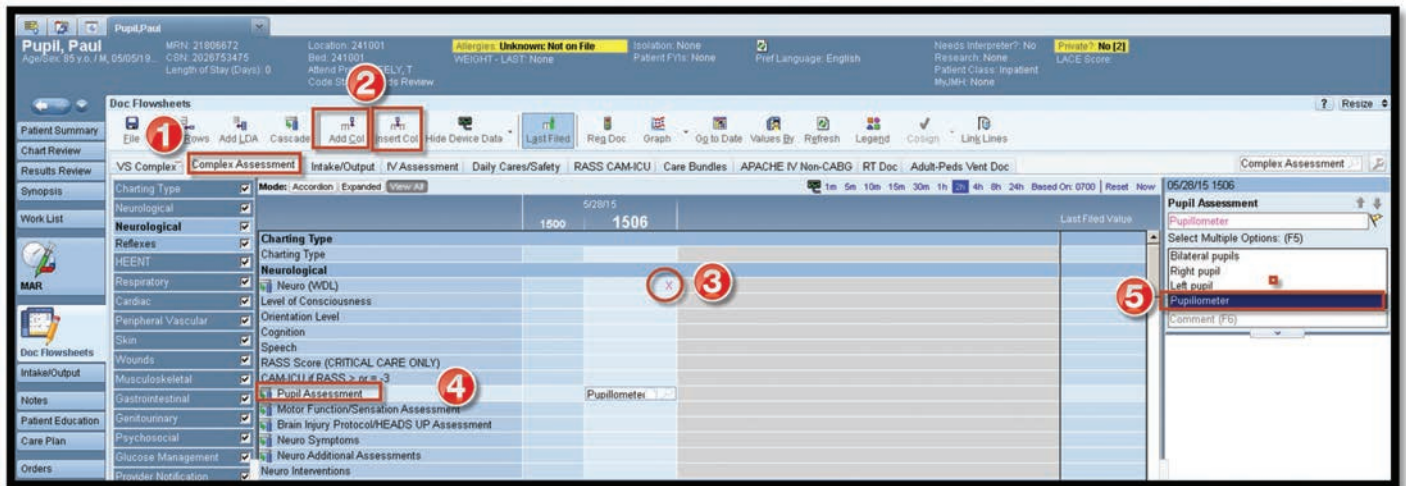
- Clinical Staff on unit has confirmed which NPi-200 Pupillary Measurement Parameters will be charted and trended in the EMR with each pupil assessment.
- Rows with numerical entry fields have been added for the above parameters in the general Pupil Assessment section, according to the pupillometer display limits in the Display Limit Table above.
- Right and Left NPi rows allow the nurse to enter any number between 0.0 and 4.9 (ex. 4.3), but do not allow for other text entry.
- Right and Left Pupil Size (mm) rows allow the nurse to enter any number between 1.00 and 10.00 (ex. 5.52), but do not allow for other text entry.
- Right eye measurements are set up in the flowsheet to be entered before Left eye measurements to reduce transcription errors from the Pupillometer.
- Pupillometer Measurement Parameters can be viewed by any clinician with access to the neurologic assessment section of the patient's electronic health record.
- Optional (recommended): Trending charts (simple line graphs) can be viewed for NPi and Pupil Size, with time of measurement on the x-axis and NPi (0.0-4.9) or Size in mm (1.00-10.00), respectively, on the y-axis.

## Appendix A: Example of Pupillometer Flowsheet Rows in Epic at John Muir Health

Documentation of the Pupillometer readings will be completed in Complex Assessment of Doc Flowsheets.

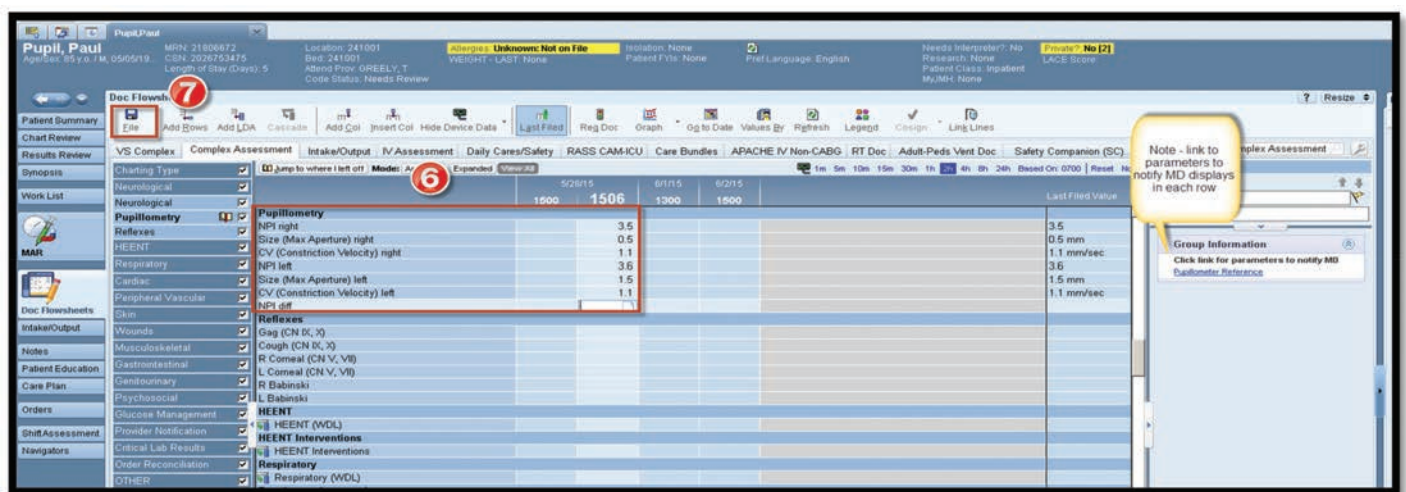
To document Pupillometer readings from the device:

1. Navigate to Complex Assessment in Doc Flowsheets
2. Add Col or insert Col for desired documentation time
3. When exception "X" to Neuro is selected, additional flowsheets cascade
4. Navigate to Pupil Assessment flowsheet row
5. Select Pupillometer choice



6. Document in flowsheet rows of Pupillometer group the readings displayed on Pupillometer device screen. Use hyperlink to MD parameters to determine whether to notify MD.

7. File



## Appendix B: All Pupillary Measurement Parameters with EMR Display Limits

### Pupillary Measurement Parameters

Parameter	Description
<b>NPi = Neurological Pupil Index</b>	Numerical value for pupil reactivity
<b>Size = Maximum Diameter</b>	Maximum pupil size before constriction
<b>MIN = Minimum Diameter</b>	Pupil diameter at peak constriction
<b>CH = % Change</b>	% of change (Size-MIN) / Size as a %
<b>CV = Constriction Velocity</b>	Average of how fast the pupil diameter is constricting measured in millimeters per second
<b>MCV = Maximum Constriction Velocity</b>	Maximum velocity of pupil constriction of the pupil diameter responding to the flash of light measured in millimeters per second
<b>LAT = Latency of constriction</b>	Time of onset of constriction following initiation of the light stimulus
<b>DV = Dilation Velocity</b>	The average pupillary velocity when, after having reached the peak of constriction, the pupil tends to recover and to dilate back to the initial resting size, measured in millimeters per second

### Pupillometer Display Limits for Electronic Medical Record (EMR) Flowsheet Integration

The following low and high display limits are included to inform hospital staff of the specific parameter display limits for consideration in the development of neurological parameter flow sheets.

Parameter	LOW	HIGH
NPi	0.0	4.9
Size (mm)	1.00	10.00
MIN (mm)	1.00	10.00
CH (%)	0	50
CV (mm/s)	0.00	6.00
MCV (mm/s)	0.00	6.00
LAT (sec)	0.00	0.50
DV (mm/s)	0.00	6.00



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